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STONE.

An Illustrated Magazine

VOLUME XVI.

DECEMBER, 1897, TO MAY, 1898

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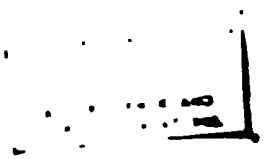
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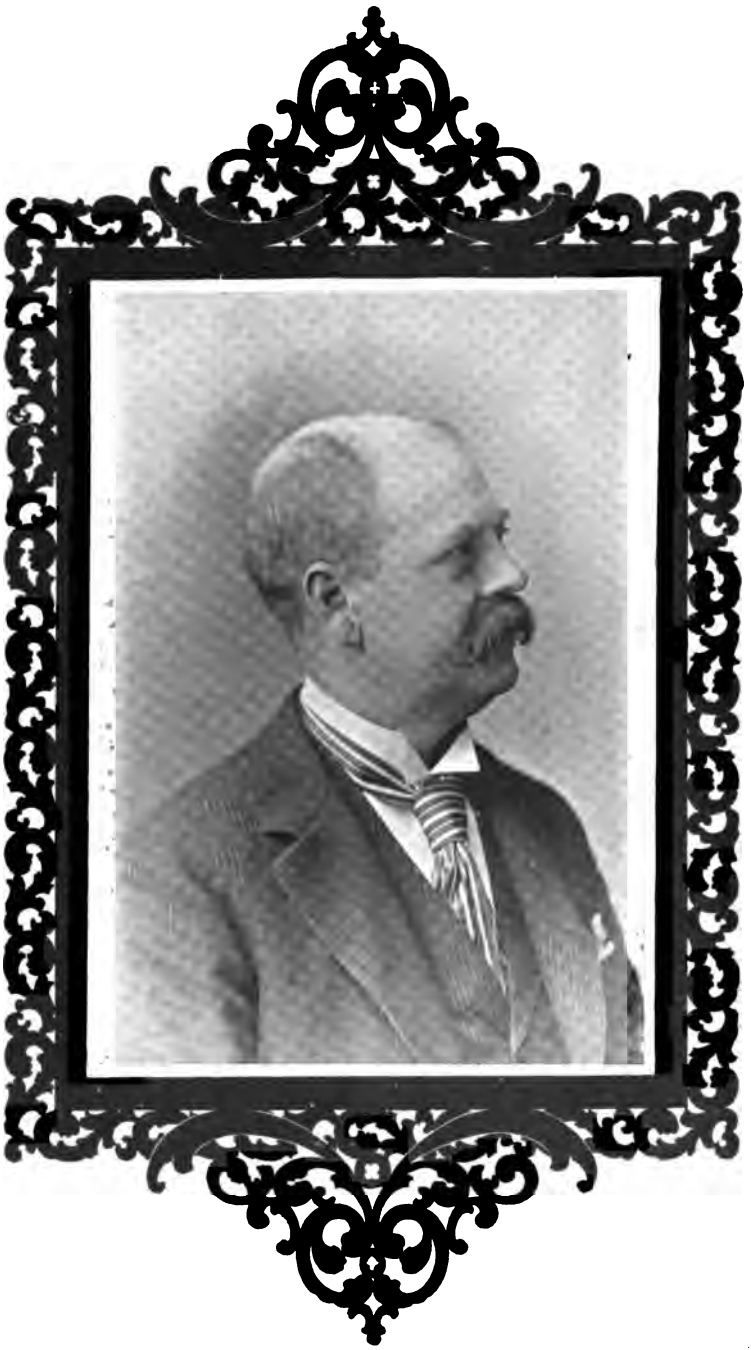
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JAMES M. WORTHINGTON.

Born November 24, 1845; Died November 1, 1897.

[See Page 13.]

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[illegible] ORTHINGTON.

[illegible] died November [illegible]

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STONE

VOL. XVI DECEMBER 1897 NUMBER 1

THE COFFER DAM PROCESS FOR PIERS V

CONSTRUCTION WITH SHEET PILES



WATER pressure against the sides of a sheet pile coffer dam is seldom provided for in an accurate manner the thickness of the piling being usually decided upon from past experience so as to allow the size and spacing of the guide pieces and waler

There are points where guess work should be eliminated as otherwise good coffer dams are often seen where the pressure has so bulged the plank as to cause leakage While this may perhaps be corrected by additional bracing simple calculations may easily be made to determine the size beforehand

The pressure against a coffer dam may act as at a Fig 4 the sheet piling being in the condition of a beam fixed at one end and loaded with a gradually increasing weight as shown by the dotted lines due to the pressure of water supposed at 62 4 pounds per cubic foot Then the load on a width 1 of the wall is $\frac{1}{2} \times 62.4 \times d^2$ and the moment of the pressure is $\frac{1}{6} \times 62.4 \times d^3$ Taking the allowable unit stress on wet timber at 1 000 pounds per square inch the thickness t of the sheet piling may be obtained from the formula

$$t = \sqrt{\frac{d^3}{96}}$$

in which d is to be taken in feet and the resulting value of t will be the thickness in inches of the sheet piling

The formula has been expressed in a graphic manner in diagram Fig 4 from which knowing the depth of water d the thickness of piling may be read directly without calculation

The addition of a strut as at Fig 4 gives the sheet piling in the condition of a beam supported at the upper end and fixed at the lower end but the practical reason is to brace the coffer dam as shown supported at both ends The load will be the same as in the former case $\frac{1}{2} \times 62.4 \times d^2$ but the

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JAMES M. WORTHINGTON.

Born [illegible] ; died [illegible] September 1, 1843.

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STONE

VOL. XVI DECEMBER NUMBER 1

THE COFFER DAM PROCESS FOR PIERS V

CONSTRUCTION WITH SHEET PILE

WATER pressure against the sides of a sheet pile coffer dam is seldom provided for in an accurate manner, the thickness of the piling being usually decided upon from past experience as to size and spacing of the guide piles and waler

There are points where guess work should be eliminated as otherwise good coffer dams are often worn where the pressure has not bulged the plank so to cause leakage While this may perhaps be corrected by additional bracing simple calculations may easily be made to determine the size beforehand

The pressure against a coffer dam may act as at a Fig 4 the sheet piling being in the condition of a beam fixed at one end and loaded with a gradually increasing weight, as shown by the dotted lines due to the pressure of water or 62 4 pounds per cubic foot Then the load on a width b of the wall is $62.4 \frac{h^2}{2} b$ and the moment of the pressure is $62.4 \frac{h^3}{6} b$ Taking the allowable unit stress on wet timber at 1 000 pounds per square inch the thickness t of the sheet piling may be obtained from the formula

$$t = \sqrt{\frac{374 h^3}{b}}$$

in which h and b are to be taken in feet and the resulting value of t will be the thickness in inches of the sheet piling

This formula has been expressed in a graphic manner in diagram 1 Fig 4 from which knowing the depth of water h the thickness of piling may be read directly without calculation

The addition of a strut as at 2 Fig 4 gives the sheet piling the condition of a beam supported at the upper end and fixed at the lower end but for practical reasons it is best to consider it as merely supported at both ends The load will be the same as in the former case $62.4 \frac{h^2}{2} b$ but the

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JAMES M. WORTHINGTON.

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STONE

VOL. XVI DECEMBER, 19[illegible] NUMBER 1

THE COFFER DAM PROCESS FOR PIERS V

CONSTRUCTION WITH SHEET PILES



WATER pressure against the sides of a sheet pile coffer dam is seldom provided for in an accurate manner the thickness of the piling being usually decided upon from past experience as to size and spacing of the guides, waler and walers

There are points where guess-work should be eliminated as otherwise good coffer dams are often worn where the pressure has sprung the plank so to cause leakage While this may perhaps be corrected by additional bracing simple calculations may easily be made to determine the size beforehand

The pressure against a coffer dam may act as at a Fig 4 the sheet piling being in the condition of a beam fixed at one end and loaded with a gradually increasing weight as shown by the dotted lines due to the pressure of water or puddle at 62 4 pounds per cubic foot Then the load on a width [illegible] of the wall is $1,4[illegible]$ and the moment of the pressure is $[illegible]$ Taking the allowable unit stress on wet timber at 1 000 pounds per square inch the thickness t of the sheet piling may be obtained from the formula

$$t = \sqrt{\frac{6M}{1000}}$$

in which M is to be taken in feet and the resulting value of t will be the thickness in inches of the sheet piling

This formula has been expressed in a graphic manner in diagram 3 Fig 4 from which knowing the depth of water d the thickness of piling may be read directly without calculation

The addition of a strut as at B Fig 4 gives the sheet piling in the condition of a beam supported at the upper end and fixed at the lower end but for practical reasons it is best to consider it as merely supported at both ends The load will be the same as in the former case $1,4[illegible]$ but the

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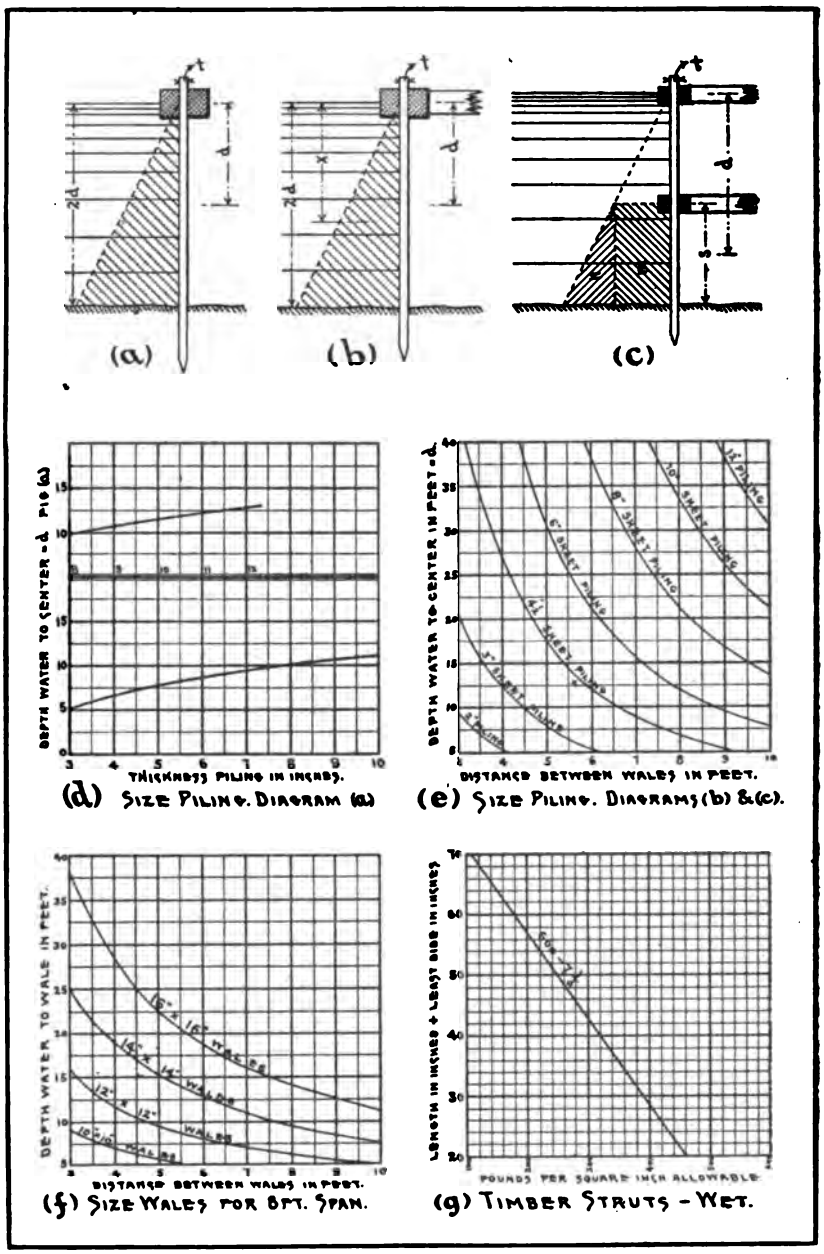


FIG. 40—ARRANGEMENT AND DIAGRAMS OF SIZES FOR SHEET PILE COFFER-DAMS.

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[illegible] ment will occur at a point which is a distance from the top [illegible] more d, and has a value of [illegible] d'. The thickness t may be [illegible]

$$t = \quad .$$

We [illegible] must the plank to be calculated is treated as [illegible] [illegible] tion that a beam fixed at both ends and loaded with a [illegible] and uniformly distributed triangular load. The exact analysis of this system is not taken up here and reference may be made to page [illegible] of "Mechanics of Materials."

If [illegible] is [illegible] we may consider the load as a uniform one and the [illegible] acting at the middle of the span. The bending moment at the middle of the span is then $\frac{wl}{8}$, which is [illegible] the span in feet and w the amount of the load which is [illegible] pressure and stress of [illegible] per square

$$t = \quad .$$

[illegible] [illegible] [illegible] [illegible] may [illegible] [illegible] by taking the depth of water [illegible] the [illegible] [illegible] when the depth of water to the [illegible] [illegible] [illegible]

several compartments, as was shown in Fig. 5, and stepped in a similar manner. When the bottom is rock overlaid with a thin deposit of clay or gravel, the sheet piles may be driven around an open crib-work for support, as was done at Harper's Ferry, on the B. & O. R. R.

Where guide piles are to be used, the waling pieces are framed in, as was specified on the Hutcheson bridge, as shown at (a), Fig. 41, where the guide piles are of sawed timber. The wales are spaced slightly farther apart than the thickness of the sheet piles, to allow clearance in driving, the space between the guide piles being filled out with a key pile to fill the panel tightly. This method is but little used with tight piling, that shown at (b), Fig. 41, allowing the piling to be driven continuously, by removing the

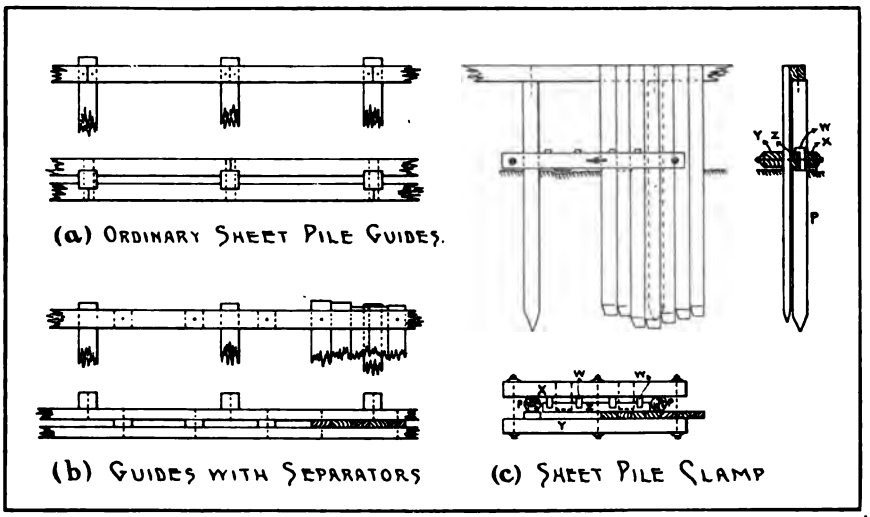


FIG. 41—SHEET PILE GUIDES AND CLAMPS.

spacing blocks as they are reached, and substituting bolts through the sheet piles, firmly connecting the piles and wales together,

A very satisfactorly method is described in the *Engineering News* of May 12, 1892, which was used by A. F. Walker. Having occasion to do a large amount of work it was desirable not to go to the expense of squared guide piles. Round guide piles (P) were first driven seven feet apart, and cut off to a level. Caps were then drift-bolted to the tops, allowing them to project slightly beyond the face of the round piles, thus forming a permanent support for the top of the sheet piles. Near the ground line was placed the clamp, consisting of two sticks (X) and (Y), connected by three bolts and drawn together as tight as the intervening piles or pile and gauge block (G) will permit. The stick (Z) is then forced forward by the wedges (W) until

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the space between (Z) and (Y) is the same as the thickness of the piles. The pieces (X) (Y) (Z) are slotted for the middle bolt, and this permits of some adjustment. When one of the piles partially closes this slot, a notch is cut in the same large enough to receive the bolt, and the bolt is then slipped up to it and tightened. This allows of the next pile being driven as close as the others. When one panel has been completed the nuts are removed and the clamps moved forward to the next one, a notch being cut in the end pile to receive the end bolt of the clamp. The piles are sharpened flatwise with a little more slope on the side facing the guide piles, giving them a tendency to drive away from the guide pile at the foot and bear against the cap at the top. A slight bevel is also given to the edge to make the foot crowd the adjoining pile. During the first half of the driving, the joint is held a little open at the top, but during the latter half, pressure

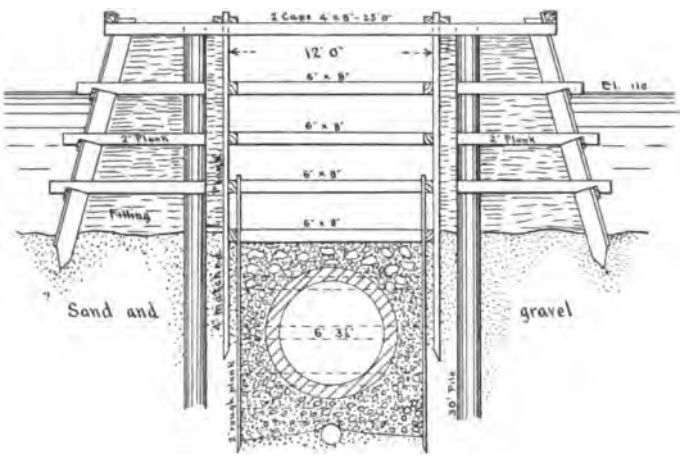


FIG. 43—SEWER COFFER-DAM. BOSTON SEWERAGE SYSTEM.

is brought to crowd it toward its neighbor, and the joint will close as tightly as possible.

The use of single pieces of timber as wales, against which the sheet piling is driven, is illustrated in the use of method (b) of Fig. 38, by Benj. Douglas, Bridge Engineer of the Michigan Central Railway. The coffer-dam (Fig. 42) was built without guide piles, the wales being 12x12-inch timber bolted against the outside of the sheet piling, by the brace rods one inch in diameter. The wales are held in place vertically by bracing of 2x12-inch pine plank, which are spiked on as verticals and diagonals to form a truss and also to stiffen the framework in general.

The sheet piling is 3x12, and after being driven into the hard gravel bottom, the cracks were lapped by 1-inch boards. The bottom was uneven

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and a corresponding difference in height the excavation at the high end being lengthened out at the low end to assist in making the dam tight. The cut-off chamber was 2 feet 8 inches wide and was filled with heavy gravel. The plan also shows the gravel packing for preventing the formation of quicksand at the bottom. The cut-off chamber was excavated and the concrete put in between sheet piling driven to hard bottom.

The above is from the Arthur Koyl bridge foundations in Vol. [illegible] of the Transactions of the American Society of Civil Engineers. Mr. A. P. Boller, in describing how sheet piling was used in connection with the foundations for the Stony Island avenue bridge over the Illinois and Michigan canal, says: "The piers are founded on the solid limestone rock, which is from 4 to 6 feet below the surface of the water. The rock is overlaid with a stratum of hard blue clay, which is impervious to water, and through which it was necessary to sink the cofferdams. Below the clay is a stratum of soft, yellow clay, mixed with sand and gravel, which is filled with water under a pressure equal to the head of water in the canal. The cofferdams were built of single sheet piling, driven to the rock, and were from 2 to 3 feet outside the lines of the piers. The sheet piling was driven by a pile driver, and was guided by a frame of timber, which was built around the cofferdam, and which was moved from place to place as the work progressed. The sheet piling was driven in the following manner: A groove was cut in the edge of each pile, and a tongue was fitted to the groove in the adjoining pile. The tongue was made of a piece of hard wood, and was driven in the groove. The timbers were shaved at the lower end to a point, and were driven by a pile driver. The dam was built double, that is, a row of piles was driven on the outside of the cofferdam, and another row was driven on the inside, and the space between the two rows was filled with concrete. The timbers were driven to the rock, and were cut off at the proper height by a saw. The sheet piling was driven to the rock, and was cut off at the proper height by a saw. The sheet piling was driven to the rock, and was cut off at the proper height by a saw. The sheet piling was driven to the rock, and was

Howard A. Carson, chief engineer, and described in the *Engineering News* of Feb. 8, 1894.

The outlet into the ocean at Deer Island begins at a point about sixty feet inside the high water line and about 1,850 lineal feet is from five to ten feet below high water. This necessitated the coffer-dam, which was constructed with bents every six feet and with 2-inch plank inside the high water line, but for the remaining distance of 4-inch matched plank. The excavation was done by means of buckets, traveling derricks and dump cars, the latter being emptied at the sides and ends of the trench. The leakage from the ocean was kept out by using centrifugal pumps, which pumped a maximum of 46,000 gallons per hour. The concrete, which has large boulders imbedded in its surface the size of paving stones, was carried up to the level of the ocean bottom.

From the middle of June, 1893, when the work was begun, to the end of September, 526 feet of trench was completed. The size of the trench was 14 feet average depth and 10.8 feet average width, which made the excavation average 5.6 yards per lineal foot. The cost for the trench, including coffer-dam, sheeting left in, and back filling was $44.00 per lineal foot.

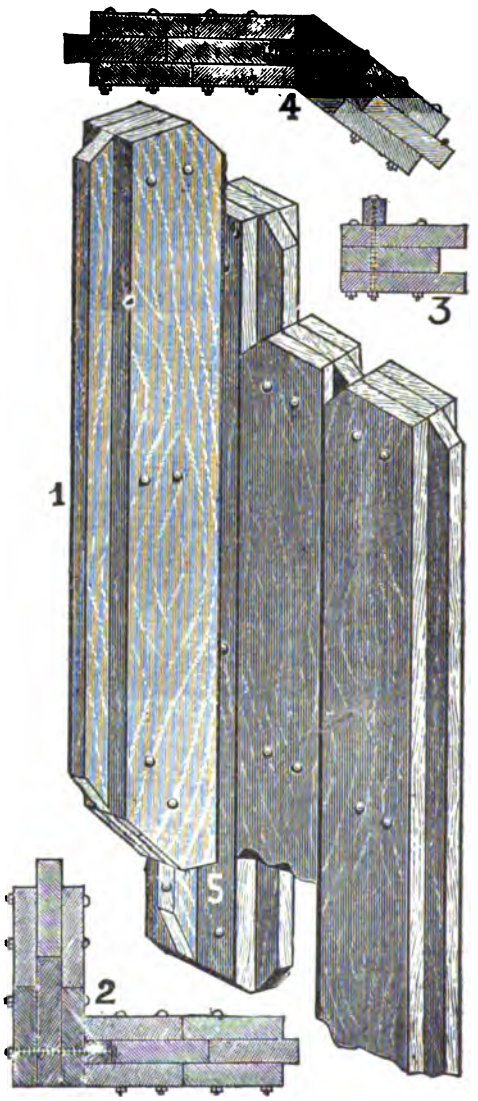


FIG. 44—WAKEFIELD SHEET PILING.

Casual mention has been made in several places of the use of Wakefield sheet piling which was illustrated at h and h′ of Fig. 38 and which is further shown in Fig. 44. View No. 1 is of a corner which is formed as in the plan

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[illegible] tongue-and-groove sheeting, which is known as [illegible] The sheeting is driven to form a curve. The general features [illegible] system are [illegible] timber, sheeting and piles [illegible] make the water and the [illegible] tight; and which can be easily obtained. The water-stakes [illegible] driven to a uniform [illegible] to ensure the [illegible] The stakes are [illegible] make the sheeting watertight. The three-plank sheeting is [illegible] and is [illegible] plank [illegible] system of [illegible] It is recommended to use a [illegible] plank [illegible] plank [illegible] plank [illegible] tongue [illegible] plank [illegible] tongue [illegible] plank [illegible] tongue and [illegible] tongue and [illegible] tongue and [illegible] tongue and [illegible] tongue. Two holes are to be staggered in every [illegible] feet of the length of the piles; [illegible] between the [illegible] piles.



FIG. 45.—TYPE OF MOVABLE AND REMOVABLE PLANK SHEETING.

The La Grange bank on the Illinois river was [illegible] with this [illegible] ing, under the direction of Major W. L. Marshall, Corps of Engineers. It was intended to back the sheeting with earth, but as the dredges [illegible] down the water tightness was [illegible] department on the Wabash [illegible] ing and under a [illegible] feet head no leaks were developed. The piles were made of three plank [illegible] to be [illegible] feet long and with a [illegible] tongue. They were driven by three [illegible] dredges with [illegible] through sand and mud and [illegible] ing; and a layer of [illegible] There was no difficulty experienced [illegible] driving the [illegible] with the [illegible] piles.

The use of [illegible] piles in the [illegible] was described by H. H. Baldwin, chief engineer of the C. & I. Railway, in constructing an [illegible] track over the Kankakee river at Momence. It was necessary to extend the piers [illegible] that river. The bottom is [illegible] and the [illegible] very irregular. Wrought-iron [illegible] and [illegible] ing a cofferdam with two [illegible] of wale of sheeting. We then tried the

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Wakefield triple lap piling, constructed of 1-inch boards sharpened to an edge, 2½-tongue and groove, which were driven with sledges until the piles, which were soft pine, conformed to the uneven surface of the rock. This piling was driven around cribs loaded with stone, and after the piling was driven, gravel was put outside the coffer-dam, after which no trouble was experienced in pumping out the water."

The work on the foundations of the new B. & O. R. R. bridge, over the Potomac river at Harper's Ferry was similar in many respects to the above, and the system was found to be very satisfactory.

Reference was made to the use of this piling on the Charlestown bridge



FIG. 46—COFFER-DAM ON CHARLESTOWN BRIDGE.

at Boston and the driving of the piles shown in Fig. 39. The work was under the charge of Jno. E. Cheney, Consulting Engineer, and was successfully carried out. The piling were driven principally as forms for concrete foundations and but little care was taken to make the dams watertight. After the concrete was deposited they were used as coffer-dams against a 6 or 7-feet head of water. They were 18 feet 6 inches by 119 feet (Fig. 46) and in some cases were thirty feet below low water or forty feet below mean high water. The piling was made of 2-inch plank and driven with an ordinary pile driver. The pumping was done with a 20-inch centrifugal pump

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and in some cases a 12-inch Robinson pump of the propeller type was used.

The construction of the sewerage system at Fort Monroe, Va., under Capt. Thos. H. Cavey, Corps of Engineers, is described in the report of the Chief of Engineers of 1910. The work was done on the general plans of Rudolph Hering, Consulting Sanitary Engineer. One of the special difficulties encountered was the building of a sewage tank fifty feet in diameter, with walls of brick two feet in thickness, externally diminishing to three feet at the center, the interior reference of which was twenty feet below low water. As described in the report referred to, this was accomplished very successfully by excavating a large area to the reference of ground water, some five or six feet below the surface, and then driving by the pile driver and water-jet combined two concentric twelve-inch piling, about Wakefield sheet piling, forty-five feet in length, 5 and 4 feet from the center about the circumference of the shaft when excavation (Fig. 4). The material consisting of fine water-bearing sand with a small admixture of clayey matter and fine gravel, was then excavated between the piling to a reference of 4 feet, frame work consisting braces bearing upon wales at stringers being put in at intervals as the work proceeded. The material did not vary much in its general nature but a number of soil samples were taken, many of which had to be moved owing to the sheet piling when driven as shown in the subsequent excavation. The water was controlled by a powerful steam pump, having a capacity of 400 gallons, the water being forced through a 10-inch pipe to the surface. It was found that good water came through the sheeting very freely at first, but that it soon practically ceased to flow to any great extent at a height of a few feet above the point of excavation as the water was drawn down owing to the rapid drainage of the strata. The water question thus became a serious one during excavating after the walls were laid in water-mortar, carried until the bottom of the external concrete ring had been set as in a plate 1 foot below the reference 20 feet, the excavation was then carried to 24 feet, at which point the bottom was concreted to prevent a flow. The concrete was rammed from against the outer sheeting externally and against plank sheeting with triangular strips nailed against the inner sheeting internally until a 6-foot ring had been placed. The joint between the ring at the pump-room floor was made water-tight with cement mortar. The 4-foot brick wall was then carried up in the annular space of the concreting, the space between the wall and the outer sheeting filled with sand except about six inches at the base of the wall which was of concrete. The braces were removed as the work progressed, the inner piling cut off and the sheeting and the extreme piling, which were left in, drawn out, the inner core was then completely excavated. On the completion of the latter work to reference 20 feet the water which came in freely from the

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out under the concrete ring at several points was conducted in a peripheral trench to the fixed point of pumping. No water came upward and the middle portions of the bottom became perfectly dry. The inner sheeting was cut off at the base of the ring, boards were placed transversely over the peripheral trench, a duck tarpaulin coated with hot asphalt laid down, and concrete rammed in place until the concave bottom with sump channel had been completed, leaving only the pipe, through which the ground water had been pumped continually, night and day at about 1,000 gallons per minute, penetrating the concrete. In order to fill this pipe, it was cut off above the level of permanent ground water, and after the water

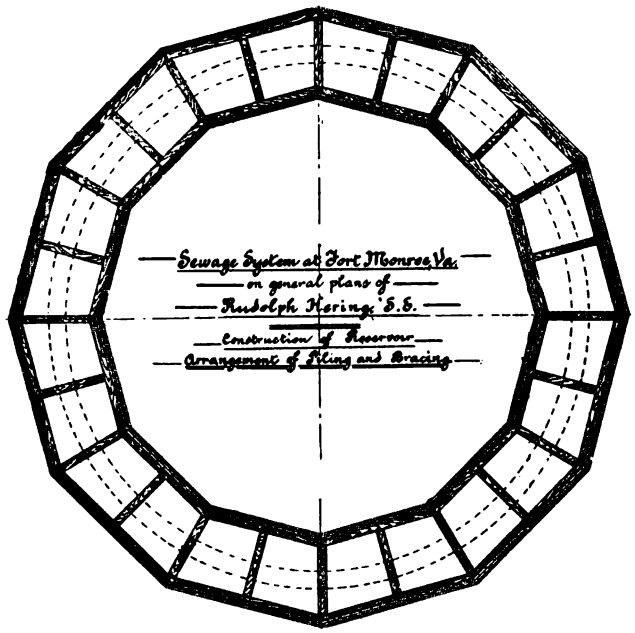


FIG. 47.—RESERVOIR COFFER-DAM. FORT MONROE, VA.

within had attained the level of ground water in the surrounding area and had become perfectly quiescent, neat cement in paper bags was dropped within, being retained at the bottom by the closed valve; the bags were readily broken up by a long pole thrust down the pipe. The latter was then cut off at the level of the bottom and a coating of cement plaster applied throughout. The resultant leakage through the bottom did not exceed about a gallon a minute and this will be greatly reduced by the infiltration of sand from beneath."

Further illustrations of the use of sheet pile coffer-dams will be given; then the operations of dredging, pumping and concreting described at some length.

Charles Evan Fowler.
Asso. M. Am. Soc. C. E.

[TO BE CONTINUED.]

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DEATH OF JAMES M. WORTHINGTON.

MR JAMES M WORTHINGTON, the president of the Cleveland Stone Company, Cleveland, O., was stricken with apoplexy, Nov 1 while on his way to the depot to take a train for his Lake home, and being carried thither on the train, died there from the effects of the stroke the same afternoon

It was the third time that he had been thus stricken, and he spent a number of months last year in a trip abroad for his health While at the office in the morning he remarked that he was not feeling well and had noticed a numbness in his right arm which was the cause for some apprehension on his part Crossing the street to see his physician, the latter was told to take rest and advised to go home, that greater attention would be required

He made his accustomed bow at the office, stopped at the Guardian Trust Company and then on his way to the depot and was just entering the waiting room when a severe paralytic stroke came partially on him He called to a gentleman who was near by for assistance, which was given, at which time Mr Worthington almost immediately became helpless on the right side He was carried to the train and arrived at his home at Lakewood in a carriage, was carried in and recognized his family and his own surroundings Soon after he sank into unconsciousness and was in that condition when he died Attention was paid by the doctors and Mr Worthington passed away

Mr Worthington was born in Forest Canada November 18th and consequently was a little more than 58 years old at the time of his death When a boy he went to Cleveland with his father John Worthington who was prominently identified as a contractor As a member of the contracting firm of Worthington & McDermott his father was one who erected the Government building on Superior street In time Mr John Worthington became a partner, serving as such with Alexander Hodge through the latter's life The firm name for many years being Worthington & Sons After the death of the latter James M Worthington became the senior member of the firm In 1890 he gave up the contracting business and entered the office of the Cleveland Stone Company as president, which position he held at the time of his death Worthington & Sons was dissolved Mr J M Worthington became interested in the Lake Shore Stone Company a few years ago He was also interested in steamboat properties

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His wife was Miss Frances Watterman, of Cleveland, and their children are John S. Worthington, of Denver, and George C., Albert P., and Miss Bessie M. Worthington, of Elyria, which has been the family home for the last twenty years or so.

The mother and a sister of Mr. Worthington are living in Toronto, and Mr. George H. Worthington, of Cleveland, and Mr. E. E. Worthington, of Chicago, are brothers.

The following memorial tribute to the deceased was adopted by the Cleveland Stone Company:

On the first day of this month, James M. Worthington, one of the largest stockholders and for many years president and director of this company, was suddenly called from the scene of his labors.

Mr. Worthington during the first half of the present year had been absent seeking the restoration of his health, which had been impaired through the faithful attendance to his arduous duties, and after these many months of extreme suffering, he had so far recovered as to be able to return to his duties, although he had received two untimely warnings which accompany the disease with which he was afflicted, and doubtless he continued in constant fear of the third warning which resulted so fatally a short time since.

His fellow officers and shareholders in the Cleveland Stone Company, at a special meeting called on the 6th of November, desire to bear testimony to their sense of loss that has overtaken the company, and to place on record their appreciation of his sturdy integrity, his fidelity, and invincible courage in the faithful performance in the duties which were laid upon him from time to time. His counsel in the active management of it was of unprecedented value; the loss of his services we deplore; and his presence we shall greatly miss. His readiness to contribute to the success of the company at all times, and the unquestioning faith in its future we shall ever hold in remembrance. Mr. Worthington was a man of kind and generous heart, and his many kindly acts to friends in need of help will long be remembered.

We tender our warmest sympathy to members of his afflicted family, and direct a copy of this minute be forwarded to them, and also that this minute be entered upon the records of the company.

J. V. PAINTER,
JAMES NICHOLL,
E. A. MERRITT,
J. H. WADE,
Executive Committee.

At a meeting of the Ohio Sandstone Quarrymen's Association held at the office of the Forest City Stone Company, on Wednesday Nov. 3, 1897, the following resolutions by old associates of Mr. James M. Worthington were unanimously adopted:

WHEREAS, We are called together to-day to mourn the loss of a prominent member of this Association. Therefore

Be it Resolved, That we deplore the death of Mr. James M. Worthington as a great loss to the business community, a severe blow to this Association, and a most grievous affliction to his family and immediate friends, to whom we extend our heartfelt sympathy, and

Be it Resolved, That as a token of our esteem and respect, members of this Associ-

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[illegible] that [illegible] that

[illegible]

After the passing of the above resolutions the House at [illegible] adjourned out of respect to the deceased

The following tribute to his memory by the Editor of the [illegible] was the best record of the common regard in which Mr Wentworth was held [illegible]

[illegible]

[illegible]

[illegible]

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hesitate to pay a price for novelties, as immense amounts are annually spent in London in marble for interior decoration, and no doubt were the beautiful soft tinted stones of Tennessee and Georgia, and the crenoidal and dark chocolates of Hawkins county, Tennessee, introduced into this market, the demand would be very large and the returns to the shippers proportionate.

Henry V. Maxwell.

[Regular Correspondence STONE.]

NOTES FROM ABERDEEN.

New granite quarries continue to be opened and existing quarries to be enlarged in the neighborhood of this city, in order to meet the ever growing export and local demand. Those engaged in the English and general export trade in the monumental branch have been finding business very good, and many of the larger works have been running extra time or taking on additional hands—a most exceptional, if not unprecedented thing at this season of the year. The bulk of the work has been the manufacture of polished fronts for hotels, bank buildings, etc., in English towns; but as regards cemetery monuments not a few orders have continued to be for bigger and more elaborate and expensive monuments than was the rule last year. The pressure is now wearing off somewhat as winter approaches. On the other hand, the monumental trade for the United States is perhaps duller than at date of last report, but numerous inquiries are now being made and a better tone is expected soon.

Mr. George Ruddiman, a competent instructor, has been chosen for the granite statuary classes at the School of Art, Aberdeen, and pupils have been selected by competition. Various quarry masters have made gifts of stones and the classes will be started immediately.

I previously mentioned that the exports of polished granite monuments from Aberdeen to the United States for the financial year ending September 30 last, showed a falling off. These exports, it may be explained, go by rail from Aberdeen and are shipped at Glasgow. On the other hand, the exports of granite from Aberdeen harbor for the same year show decided increases in various particulars. Thus for 1896–7 31,400 tons of crushing stone were exported by sea as against 22,000 tons in 1895–6, and 8,982 tons of polished granite as against 8,524 tons in the previous year. In curb, pavement and building stone, 4,236 tons, and rubble and chips, 11,217 tons, there is some reduction. Road metal, 2,769 tons, has been calculated separately this year for the first time. I have obtained these figures early from the Harbor Board's books, and as the causeway setts may be taken as of the average value of between 23 and 24, and the polished granite at £16 per ton, the figures are interesting, as they go to show that there was a considerable net increase in the Aberdeen granite trade last year.

I may also mention that during 1896–7 no less than 13,874 tons of rough foreign granite were imported by sea into Aberdeen for monumental purposes, as compared with 10,340 tons in 1895–6. Owing to the activity of the building trade timber imports show a rise of 10 per cent.

HEATHERBLOW.

Aberdeen, Scotland.

"I consider STONE one of the very best of the numerous good magazines published in America. The original articles, general information, illustrations, typography, and paper are all first-class, so that the subscriber gets very good value for his money. Every engineer, architect, stone-cutter and quarryman should read STONE."—*Robert Bell, F. R. S. of the Geological Survey of Canada.*

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LABOR TROUBLES IN THE FAR EAST

THERE is no place in the world where the labor question is so easily [illegible] as in China. There there are no lockouts or strikers, nor have there been any for a couple of two thousand years. The bricklayers, plasterers and carpenters all time their forenoon on either side of the public square and wait until they are wanted. The master builder comes along and puts a [illegible] on whose services he requires. They follow him and get to work. No quarrel about wages or overtime. The least sign of discontent and off goes the head of the kicker. All are glad to see it fall into the basket and go peacefully to work more to work. The master builder however must have things his own way. There is a fixed rate of wages for each man he must pay and a certain number of hours defined, above which no man can be worked by special permit from the government and for which he must be paid for accordingly. Once a man employed he is [illegible] whether he works or not working as the work he is engaged on [illegible] until it the work is done. If and ran prevents him working he must be paid just the same. Time lost by the workmen in the course of the contractor suffers no loss on this account. But if the contract or to pay wages of the workmen under the [illegible] to do so. The owner has to look to the workmen and the contractor must have with the contractor. The relation between the workmen and the government is that the government pays the workmen [illegible] and the workmen [illegible] the government. The workmen [illegible] the government [illegible] the workmen [illegible] the government [illegible] the workmen [illegible] the government [illegible] the

members of the association, they were immediately called out by the walking delegate, and Connell had to be discharged from that employment in order to induce them to resume work. He was similarly excluded from work in other places in this city, as the stone-cutters there were "union" men. Connell recovered judgment in the City Court against the association for about $400, being the wages of a stone-cutter for eighteen weeks, the period for which he was deprived of work on account of the action of the association against him. The judgment below has been affirmed by the Appellate Term of the Supreme Court, in an opinion by Presiding Justice Daly. The court holds that it does not appear that in refusing to surrender his books to the special committee, Connell violated any provision of the constitution or by-laws. By those by-laws he had the right to retain the books until required to deliver them to the trustees to audit, or to be turned over to his successor in office. The court holds that the defendant's claim that the plaintiff had, in consideration of their agreement to restore him to his rights as a member, agreed to drop or discontinue all legal proceedings which he had instituted, was no defense, the plaintiff not having released or agreed to release his claim for past damages. "The suspension of the plaintiff being unlawful," the Presiding Justice said, "it was the duty of the defendant to reinstate him, and its doing so resulted in no disadvantage to it."—*New York Times.*

ROMAN MONUMENTS.

THE circular form was a favorite one with the Romans for their sepulchral structures of a more pretending class than ordinary. It will be sufficient here merely to mention those in honor of Augustus and Hadrian. The tomb of Cæcilia Metella is a low cylinder, the height being only 62 feet while the diameter is 90, and it may be considered as nearly solid, the chamber or cella being no more than 19 feet in diameter. This cylindrical mass is raised upon a square substructure, which combination of the two forms is productive of agreeable contrast, and it was accordingly frequently resorted to. The tomb of Plautius Sylvanus, near Tivoli, consists also of a short cylindrical substructure on a square basement, but is otherwise of a peculiar design, one side of that stereobate being carried up so as to form a sort of low screen or frontispiece, decorated with six half-columns and five upright tables with inscriptions between them. The tomb of Munatius Plancus, at Gaeta, is a simple circular structure, of low proportions, the height not exceeding the diameter, and therefore hardly to be called a tower, notwithstanding that it is now popularly called Roland's or Orlando's Tower. Of quite different character and design from any of the preceding ones is the ancient Roman sepulchral monument at St. Remi, which consists

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MICA ITS USES AND APPLIANCES

THE present [illegible] of the Mica Manufacturing Company [illegible] their mineral rights of mica properties in the [illegible] and Buncombe Counties, North Carolina, invite attention to the general uses and applications of this interesting and useful mineral or rather group of minerals.

The name mica is derived from micare to shine or glitter from this cause; [illegible] characteristic with most persons and the word mica is applied to a large [illegible] group of finely foliated minerals of a pearly lustre and transparent and translucent though and elastic. The distinguishing features are their [illegible] lustre or glitter, and the readiness with which they can be separated into any desired thickness, into lamina or leaves of transparent plates. These laminæ can also be cut or divided with the aid of an instrument of steel having such a thickness that the sheets or plates readily to the thickness of [illegible] part of an inch. Another remarkable property of the mica besides their distinct cleavage in one direction is their great elasticity and toughness. It is claimed in this respect to have very few materials, and in the combination of the two elasticity and toughness mica is perhaps excelled by no other natural or artificial.

The group of micas can be classified in two divisions Muscovite, or potash mica, and magnesia, or uniaxial mica.

Muscovite or biaxial mica is in color amber brown white [illegible] rose white red violet, gray and green green and black having the usual [illegible] with pearly metallic lustre. It can be fused on the edges before the blow pipe and has very high infusible [illegible] It consists of silica alumina potash [illegible] water [illegible] and [illegible] and water [illegible] Muscovite mica varies in hardness from [illegible] to [illegible] in density from [illegible] to [illegible]

Magnesia or uniaxial mica also called [illegible] is usually brown red

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dish, yellowish brown, olive green, gray, with pearly luster. It whitens in the blow-pipe flame, and melts on thin edges. Its hardness and density are identical with muscovite mica; and it is also so tough and elastic that it can be split or cut into sheets of tenuity. In magnesia mica, a certain proportion of magnesia replaces alumina, which is present to the extent of about 15 per cent. Magnesia mica is generally found in limestone.

Other names given to micas are the fuchite, a green mica, containing chrome; plumose mica, in which the scales are arranged in a feathery form; and rubelland, which is a name given to red mica. Granite is composed of crystals or crystalline masses of mica, quartz and feldspar.

Mica is often confused with talc. But it differs from talc inasmuch as it affords thinner folia, and is elastic, and has not the same greasy feel. Then again, talc will yield to pressure or indentation, while mica is nearly as hard as calcspar.

Mica is sometimes found in plates, two or three feet in diameter, and perfectly transparent, in which state it is well adapted for use as a substitute for window glass. Its common use in this way in Siberia has procured for it the name of muscovy glass. It was formerly much used in the Russian navy, on account of its elasticity, rendering accidental explosion by percussion or concussion well nigh impossible. Mica ground in a mill increases vastly in bulk, and forms a loose mass of scales, not unlike bran. In this form it is largely used in a mica powder as an absorbent of nitro-glycerine its peculiar elasticity rendering explosion impossible, while it does not interfere with the power or energy of the nitro-glycerine when exploded by a fulminate or other similar device. Mica, coarsely pulverized, is found to be an excellent roofing material, to which use it is also applied in the same manner as slate. It is also used in pulverized form for calico printing, and for decorating porcelain and glassware. When finally ground and reduced to powdered form, mica has a slippery and greasy character, and makes a good lubricant for railroad axles, bicycles, etc., and for all machinery requiring high speed. It keeps the bearings free from heat, even at the greatest speed, and in the form of axle grease for railway cars, etc., it meets all requirements. Scrap or refuse mica, which has hitherto been regarded as valueless, is now used as a most efficient covering for steam boilers and pipes, on account of its non-conducting quality. Mica is also very largely used for electrical machinery, its insulating power being superior to that of any other substance. It will stand the highest test of heat, and is infusible, tough, and non-combustible. In this use the Canadian mica, more generally known as amber mica, being of amber color, is the most in demand in Canada and the United States. Mica is generally applied to marine compass dials, being highly superior to cardboard for the purpose. It is also used in the lettering of fancy signs; and, when very clear, affords a better protection to photographs than enamel. It is artistically applied

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as the mat and reflector in lamp shades. With the aid of chromo-lithography, exquisite designs are printed on sheets of mica, three or four of which are then cemented together and form a really beautiful design. The whole process adds a world of interest to the microscopic study as the fresh layers of cream between the layers, in many instances of metallic mica, show them forth in glowing specimens of wonderful beauty. Mica is also used for chimneys of lamps of all descriptions and for automatic and other stoves also as a substitute for glass in spectacles in protecting the eyes in various manufacturing operations, and again as a substitute for glass in covered reflectors in places where it would be exposed to heat, as in headlights etc. Mica with varnish or paint is used as a coating for wall papers and in bronzing ornamental and other plaster articles. It is also applied in various modes to the decoration of churches, rooms, picture frames, and for other ornamental and useful purposes. From its unalterable nature it preserves the glowing colors resulting from determination and from the application of the art to which it is put long after the original colors have disappeared. They are moreover further preserved by the application of mica in a state of powder which when mixed with the paint or varnish excludes air and dust and the moisture which would otherwise, by decomposition, destroy the colors.

Reference is made upon the cover of the sheets and books to the patents which have been obtained in various countries for the manufacture of mica, being the best sheet in use and the one which gives the least trouble.

Such are the principal uses and applications of mica, although to enumerate and describe exhaustively would be impossible. Its properties have been found to be so many and so varied that there appears to be at the present time a large and gradually increasing demand for it from all parts of Canada and the United States, but also in England and the continent of Europe. The Mica Manufacturing Company proposes to extend its operations to the mining of the mica, and to prepare the same in England and Europe, and to supply the Canadian and American markets for all purposes. (Extract from Mining Journal.)

WHAT IAMOND STATUES CONSIST

WHILST the Imperial Cameron statue at Pittsburgh is the object of much interest to visitors, and many inquiries are made as to the material of which it is composed, the statue of Mercury in the Crystal Palace grounds, Sydenham, is also an object of curiosity, and many visitors there inquire what it is made of. It is not generally known that the statue is composed of diamonds, and that it is the largest diamond in the world. It is of interest to know that the statue is composed of crystallized carbon, the same substance as the diamond, but in a different form. The Crystal Palace authorities have not yet decided what value to put upon the statue, but it is supposed that it is worth about £1,000,000 sterling. A fac-simile of the statue of Mercury was made by Messrs. Rundle & Co., of New York, and

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in Gaul. The sculptor worked ten years on it, and its total cost was about $1,775,000. Athens was the resting place of a number of magnificent statues. The head af the Olympian Zens in that city was worth about $25,000. The statue of Athena had a draping made of the purest gold, and estimated to be worth $580,000 alone. The statue itself was made of the finest ivory. It takes money to put up "great" statues.

MANY MONUMENTS.

A WASHINGTON correspondent of the Nashville *American* says that a party of Southern gentlemen recently visited the national capital for a week of sight seeing. As they turned into Pennsylvania avenue they found themselves next to a saloon.

"Let's take a drink," said one of the party.

"We have just had one," said another.

"It would be a good idea to settle on how often we shall take a drink during our week's stay," said the third.

"Well," said the first, who just then caught sight of the ever-visible Washington Monument, "let's take a drink every time we see the monument."

"I'm agreed," said No. 2, "providing we don't take one any oftener."

"It suits me," said No. 3, "providing we do take one every time we see it."

They were faithful to their plight. But they didn't stay a week. Instead they took the 4 o'clock train that afternoon for New York, one of them remarking to the conductor as they boarded it:

"Mosh shingler town. Everybody gone daft on Geor' Washton. Put up monument to him every shtreet corner. Georgie mush been—hic—bully boy."

A CANADIAN GEOLOGIST HONORED.

OTTAWA papers have observed with a good deal of gratification that Dr. Robert Bell, of the Geological Survey of Canada, has received the high distinction of a fellowship of the Royal Society of London. Only a few new Fellows are selected each year out of a large number of candidates, the membership being limited. Neither wealth, nor social position, or political or personal influence is of any avail in the selection of the Fellows of this Society; the candidates are judged solely by the value or merits of the scientific work they have done. Few Canadians have attained this honor which, however, is but a fitting recognition of Dr. Bell's long and valuable services to science in this country.—*Manitoba Free Press.*

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PRACTICAL STONE-CUTTING I.



INTRODUCTORY REMARKS.

"RAMP and Twist" we believe to be the accident at [illegible] and [illegible] gentleman a very fascinating subject. What [illegible] ing [illegible] a [illegible] when standing at the base of [illegible] I [illegible] [illegible] ing [illegible] at the [illegible] [illegible] I [illegible] [illegible] [illegible]

widely practiced being the tangent system. Of this school may be named such writers as Weston, Cupper, Loth, Gould, Riddel, and Monckton. The systems as taught by the two last mentioned writers may be taken as the typical representations. The resulting patterns by any of these authors are the same, and of course the form and contour of the rails produced will be the same; so that in reality they are the one and same system practically, differing only in the manner of arriving at the same form of bed and joint patterns and bevels. In this system all joint surfaces are made square to tangents and cutting surface of the block. If there is a joint connecting two pieces of rail in the curve, tangents of both pieces must be of the same pitch or inclination. This system allows of no easing being made connecting rail and straight piece, except where tangents to easing is the same pitch as that of the stair, great care has to be exercised as to the planning of the stairs, because the tangents are the governing principle, the curve of the rail being made subservient to the tangents. In a sense the stairs are designed to suit the rail, instead of the rail being made to suit the stair. In many cases where it is right to make the rail follow the line of steps, the rail has to be diverted from its natural course owing to the unavoidable position of tangents, causing variable lengths of balusters.

Antagonistic to the above is the school that works to a known curve of rail called "the center falling line." This curve is ascertained by developing the center curve of plan, and setting up the elevation of steps or heights, putting in any necessary easements, etc. In this system all joint surfaces are made normal, that is, square to the center curve of the rail, and at any point desired. Tangents are made use of, but they are made subservient to the curve of rail, and their position determined by some positive geometrical rule. The joints of this system are much more difficult than those of the tangent school, as they are not generally square to tangents or cutting surface, but the leading principles are few and simple and when the student has mastered about four examples he may correctly work out any case that may meet him in actual practice. In the tangent system the operator is ever on the rack as regards the position of risers in the stairs and tangents for the rail. Hence the great number of examples, in the hope of meeting every form and difficulty, that are presented in the printed works of this school. The writers of both schools have, however, confined themselves to laying down rules for the guidance of the wood-worker, or rather gave rules for forming the handrail comprised of wood.

Many readers will naturally ask, are not the rules and methods made use of in setting out and cutting a rail composed of wood, applicable if the material made use of be granite, marble or sandstone? We answer in some few cases they are, in the majority they are not, and will in as few words as possible endeavor to give reasons for so answering. As a rule, especially

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in K—I—J—L. Our readers do not have to be experts in the science of geometry to at once see that a rectangular section as that given in R—S—Q—P, which is similar to that given in all works upon handrailing, for a similar problem, is not the correct one. The contour of the outer and inside faces should be curved, as shown in the section X—U—V—Z at the left, which is correct. We admit that when as in the case of a rail whose thickness and height does not exceed three inches, a section similar to that given at the right may be approximately near enough; but when as is often the case in stone coping, the thickness exceeds twelve inches, then near enough methods are not to be thought of. Let us have correct systems.

Now a few words respecting the methods employed, that of the wood-worker and that of the stone-cutter, in bringing their respective material to its required form. First, take that of the wood-worker. A piece of wood is selected the top and under sides of which are parallel, one being planed up "true and out of wind." This is termed the working surface. The required size of the piece of material at this surface is in the majority of cases that as given by the developed bed mould, (termed by wood-workers as the face mould). This mould is marked at the working surface, and the wreath is then formed to the contour given in such a manner that the sides are square with the working surface. The joint surfaces are then cut square both with the working surface and to tangents as E—C and C—F of Fig. 7 (Plate I) of the bed mould. Lines as W—B—X and Y—A—Z are then squared through at the joint surfaces and the half thickness as that shown in A—B marked at the joints. A joint or plumb bevel is then applied, which gives an oblique line as F—A—J, at the lower joint surface. In many cases two of these bevels are required, one at each joint surface. (At this example we have taken the plumb line at the top joint surface as being square with the working surface.) These lines give the direction at which to apply the joint sections as shown in the diagram, and also that at which to apply the bed mould, in order to form the plumb cylindrical sides of the rail piece. Thus as illustrated in Fig. 7, the point at which the tangent C—F of the mould would be applied at the top surface is given in F, at the lower surface in the point J.

The bed mould is then applied as shown and the convex curve I—G—U at the top, and the concave K—N—V may be marked at the lower surface of the wreath. The reader will notice that we are not enabled to transfer the concave curve to the top or the convex to the bottom surface of the wreath, owing to the mould projecting over the cylindrical sides first formed at the wreath. As may be noted the mould projects a distance V—Q at the top and O—V at the lower surfaces. The wood-worker, in order to form the plumb sides of the rail piece, now tacks or screws the mould onto the top surface, and thus obtains the direction at which to form the concave side.

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in a similar manner by fastening the mould onto the under surface of the pattern at which to obtain the convex face. As in the former we have such a procedure cannot be followed in cutting out the core, we cannot screw the necessary bed pattern onto the rough core, therefore some method must be adopted to overcome this difficulty. The shape first assumed in the rough core by the method of the wooden core box as we think by adopting a systematic method of cutting the core may be rapidly brought to the required shape in the time consumed in the first method. The explanation and a study of the drawings which will illustrate at the method of the wood worker's mind before he begins the actual work.

In order to assist the student in getting a better understanding of this subject we have given a series of drawings and explanations of the principles of the Tangent system of Moulding. These models consist of a number of geometrical figures upon which the Tangent System of Moulding is based, and the representation of the same by means of Tangent planes. The intersection of these with the surface of the model which the application of the tangents to the former is made, and in determining the point where the curved line of the moulding meets the straight line of the face, and in obtaining the true shape of the moulding when laid at the proper point across the face. These models have never before been shown in any of the printed works of the Tangent System. The centre curve marked at the setting line between the two lines of the face together with the curved line at the two ends of the moulding are projected. These models will prove of great value to the student who wishes to get a thorough and practical knowledge of the method to the most in the manner in which the principles are set forth. Also the models will be found most useful in the practical application of the principles.

There are many methods employed with the aid of which the pattern maker may make with the work quicker, easier and more perfect than by the old method. The Tangent System of Moulding is one of these methods. It is the purpose of this work to assist the student in obtaining a knowledge of the principles of the Tangent System of Moulding which will enable him to apply them to the work.

means to be employed to overcome this difficulty, asks of the student "To take the rail piece in his hand and place it in the position it would naturally occupy over its plan, the manner in which to apply the bevel will then be clearly seen." Of course this operation may be all right with a rail composed of wood, but as stone-cutters we know that in cutting stone such a rule, if not an impossibility would be very difficult of application. We might use quotations of other writers, but the rules given to overcome the difficulty are, when applied to the cutting of stone, quite as difficult of application. The real trouble seems to consist not so much in the construction of the bevels and joint sections as in their proper application. The writer having recognized this stumbling block, it led him to investigate the matter and see if some method could not be employed by which the bevels and sections may be developed at the representations of the points at the drawings at which they are to be applied, and thus remove all doubt as to their proper application.

The methods to be described herein for this purpose are the result of observation and practical application, and we believe their simplicity and practicability will be admitted by all who take the trouble to examine them impartially. Of their superiority over the methods usually employed there will be little doubt if the two are fairly compared with each other.

PLATE I.—*Explanation of Terms, Together with a Few Problems in Elementary Geometry:* As there will be frequent occasion to make use of certain terms, which is of importance to have fully understood, we will before proceding to the work of a practical nature give explanations of the tems employed. The definitions which are here subjoined are intended to instruct the uninformed and prepare him to proceed with that part of this work wherein their application will be found absolutely necessary. The terms are as clearly stated as the nature of the present work will admit. If the student desires a more detailed explanation he should procure some standard work upon descriptive geometry.

A Point. Abstractly considered a point is said to have position without magnitude, and is, therefore, represented to the eye by the smallest visible mark or dot.

A Line is length without breadth or thickness. A right line is a straight line and the shortest that may be drawn between two given points.

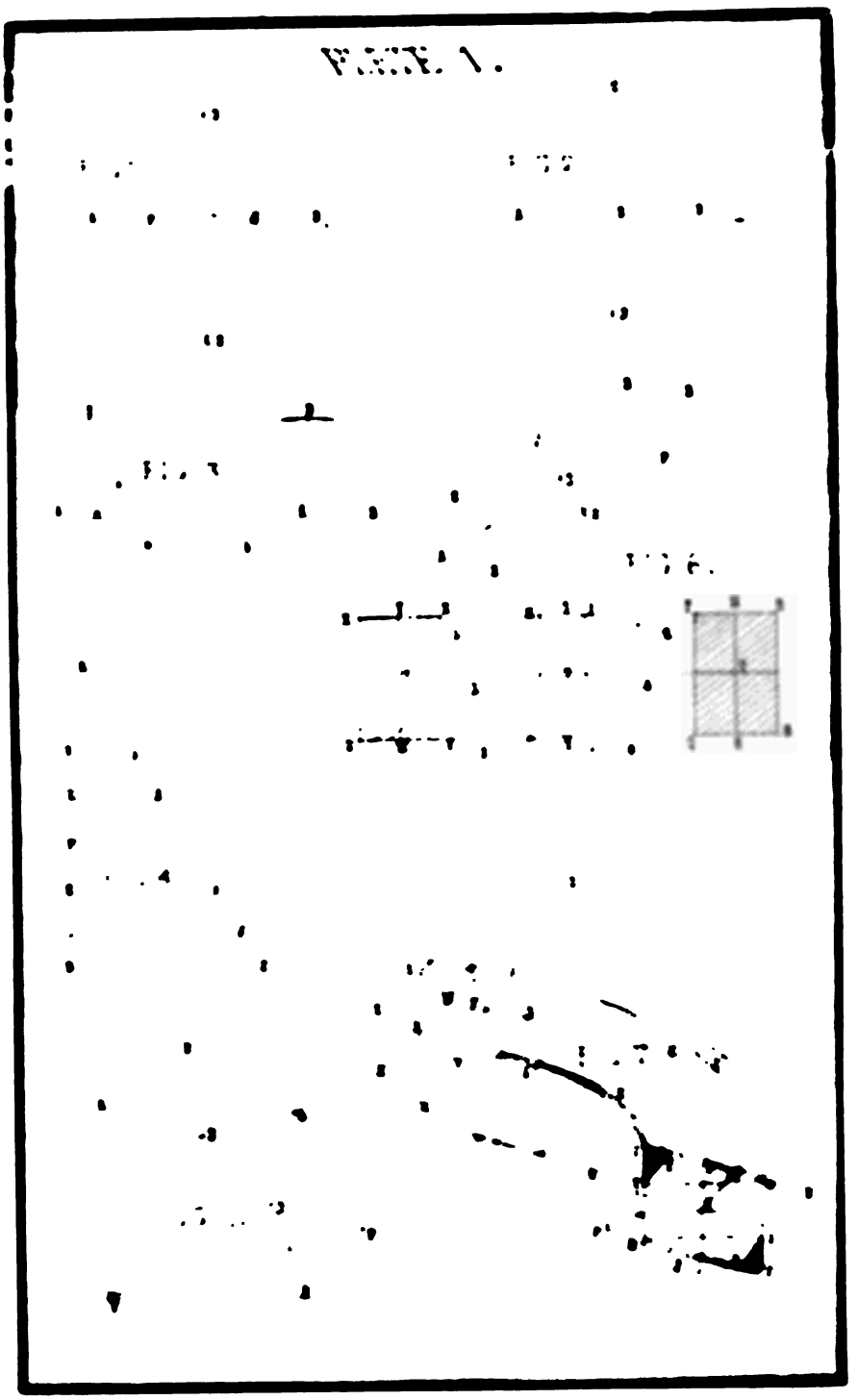
A Plane Surface is a flat surface which coincides in every point with a straight edge.

The Horizontal or *Ground Plane* is that plane on which the plan is drawn.

The Vertical Plane is any plane considered as standing perpendicular on the ground plane.

The Oblique, Cutting, or *Section Plane* is that plane on which the bed mould is produced.

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The Joint Planes are planes on which the joint sections are produced. These are in some examples oblique; in others "parallel" to the axis of the wall curves.

The Axis is a vertical line which passes through the center with which the plan curves may be drawn.

The Trace of any plane is a line forming the termination of one plane and its junction with another. Thus the angle of a block of stone is the trace of the plane of any one of its sides on another side which it meets. The trace, therefore, is a line and the only line which can be drawn common to either of two planes meeting each other at an angle. There are in general two traces employed—the vertical and the horizontal.

A Cylinder is a solid described by geometricians as generated by the rotation of a rectangle about one of its sides supposed to be at rest. This quiescent side is called the axis of the cylinder. Therefore the base and top of the cylinder are similar and equal circles.

A Prism is a solid whose base and top are similar right line figures with sides formed in planes and rising perpendicularly from the base to the top.

An Ellipse or a segment of one may be considered as the section at a plane which cuts or intersects the axis of a cylinder obliquely.

Tangents. Those made use of at the plan are right lines touching the center curve at the point at which joints are desired. The tangents are at right angles to the radius of the curve, drawn through the point in question. The tangents made use of at the section plane are the intersections of tangent planes of which the plan tangents are the horizontal traces with the surface of the section plane.

To Produce a Line means to draw it longer in either direction.

FIG. 1.—To bisect a given line A—B, take any distance in the compass greater than one-half, as that of A—C; then with A and B as centers and A—C as radius describe arcs intersecting in D—E; draw the line D—E and it will bisect the line A—B in the point G perpendicular.

FIG. 2.—From a given point C to let fall a perpendicular to the given line A—B. From the point C, with any radius greater than the distance of A—B, describe an arc cutting A—B in the points A—B. Then with any radius and A—B as centers describe arcs meeting in D. Join D with C, which will be the perpendicular required.

FIG. 3.—At a given distance a—b, parallel to a given straight line A—B, to draw the line C—D. In the given line A—B take any two points as c—d as centers, and with a—b as radius draw two arcs as shown in C—D. Through these points produce a line which will be the line required.

FIG. 4.—To divide a given line A—C in the same proportion as another line A—B is divided: Place the two lines together at their point A making any angle with each other. Join B with C; then parallel with B—C through

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the given point as D. From C draw the line D d. From A draw the line A d, which will be the required projection in the same projecting plane A B and D d. Angle to make an angle that shall contain any proposed number of degrees in a given line. Case 1. When the given angle is a right angle. Let C B be the given line and C the given point. From C erect the perpendicular C A and B C A is the angle required. Case 2. When the given angle is more or less than a right angle. From C as a centre describe the quadrant A B, from which the same ratio and A B may be set off the proposed angle in the projection D E. As for example, to make the angle D C E make an angle of 45° with B C, and another degree to make an angle of 60°. Bisecting the angle D C E we obtain B C G an angle of 45°. Bisecting B C D an angle of 15° may be obtained. From this method a much greater number of angles may be obtained. As angles of 30° and 60° are right angles as B C D B C E, so the bisection of any greater than a right angle are as follows:

SWEDISH GRANITE.

From the Norwegian frontier as far as the Gulf of Bothnia there is an almost uninterrupted series of gneiss and granite formations, averaging about three miles in breadth, along the coast are good and safe harbours for ships of any size, vessels may lie in safety at anchor in many places as far as the mouth of the rivers in numerous places. South and near Warberg and Halmstad are found in many places calcareous Carboniferous and Devonian formations to a great extent.

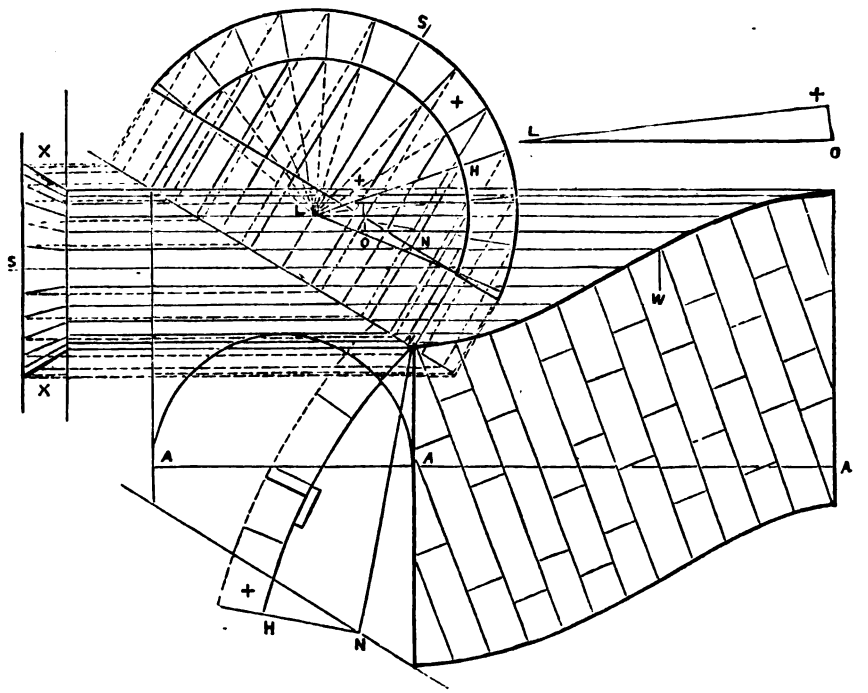
The granite has been carried on in many places to a great extent, and many of the quarries are worked by the Government, others by private companies, and some by individuals. The granite is of a very fine quality, and is largely exported to Germany, Holland, and England, and is used for the construction of the docks at Hull, Liverpool, and London. The granite is of a very fine quality, and is largely exported to Germany, Holland, and England, and is used for the construction of the docks at Hull, Liverpool, and London. The granite is of a very fine quality, and is largely exported to Germany, Holland, and England, and is used for the construction of the docks at Hull, Liverpool, and London.

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OBLIQUE ARCH.

THE method of finding moulds and bevels required to complete this piece of masonry is shown in the diagram annexed:

The method of setting out the work is as follows: Lay down the angle required and the arch, which divide into as many arch stones as are required. Let fall the perpendicular lines from the heads of arch stones. They will strike the angle line. Square out at right angles from these points to intersect with development of arch A A. This will give the soffit mould. At the left hand all the bevels required are found in the same way. To work the quoin heads: To find twist of each course, trace down the springer



lines to the radius point, also the same joint at the opposite side of arch. Where these lines meet at a point, L, take the depth of beds from this point and the difference will be the twist on the length of course. The sweep in center is the oblique course curve running over the finished arch soffits. Take the height of arch at N N, say some length down from a line, H N, horizontal. This will give bevels to the interior joints. When applying bevels to quoin heads keep template on line shown at W in development. This method of setting out and diagram is from Mr. Alexander Thompson, Gateshead, England, and contributed to the *Illustrated Carpenter and Builder.*

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NORMAN GOTHIC OR MEDIEVAL ARCHITECTURE.



In our paper on Byzantine Architecture, we alluded to Norman as a style of architecture which we termed Romanesque. The peculiar characteristics of Roman architecture which distinguished it from Grecian was the introduction and the employment of the round arch. The use of the arch was unknown to the Greeks. The arch was to a limited extent employed by the ancient Egyptians and perhaps Assyrians, but the use to which it was applied by the Romans rendered the construction of underground passages or sewers and the like. It does not appear to have been employed to any great extent in the construction of large edifices or private dwellings as it was by the Romans.

It does not appear that the Romans employed any of the orders of architecture as they are now known. They appear to have been satisfied with the Tuscan and Doric, and there is no evidence that they deviated from it.

The Romans at the dawn of the Christian era held an empire, which was over the entire civilized world, and wherever they went they carried with them the Roman laws and customs. Roman cities and architecture. The Roman influence extended over a period of several hundred years and gave character to the prevailing style of architecture.

The Roman style of architecture was by never surpassed, and many of the works of the Romans may be attributed certain characteristics which have not been equalled by the modern nations of the present day. With the decline of the Roman power came the decline of Roman art and architecture in general, and the Romanesque style underwent many changes, and in the remembrance of Roman art were modified by the Mediæval architecture.

Norman architecture is the name of the many buildings of Romanesque architecture and Grecian intermediate period between the Roman and the pointed Mediæval architecture.

The Normans were a race of people who at the time of the Conquest of England had been settled in Normandy for many years. They had become a powerful people, and had established a government of their own, and had become a powerful people.

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After the conquest of Britain by Julius Cæsar came the introduction of architecture into that country. Prior to this event the inhabitants were in a half-civilized condition, possessing little or no architecture of their own. It is presumed that their dwellings were of the most rude construction, being but little more than mere huts. Churches, they had none, and their temples were the groves, where Druid priests performed the sacrificial rites of their religion, or their bards sang the praises of heroes and recounted their deeds of valor.

We have selected Great Britain as the nation in which Norman and Gothic architecture has received their highest development and will confine ourselves to the consideration of its architecture.

As we cannot fully comprehend our subject without introducing what is generally termed Saxon architecture, we will first give that subject our attention, and in doing so, I shall make copious extracts from Fergusson's "History of Architecture," the Encyclopedia Brittanica, and other equally reliable works.

Says Mr. Fergusson: "After the departure of the Romans, the various tribes that inhabited the islands were left so feebly organized and so unequally balanced that they could find no better occupation for their time than that of cutting each other's throats, in which they were afterwards so ably seconded by the Saxons and Danes, that it is in vain to look for any development of the arts of peace among them. They were equal to the erection of a Stonehenge or an Avebury in honor of those who fell in the struggles against their foreign invaders, but beyond this their architectural aspirations did not seem to have reached.

"With the establishment of the Heptarchy (that is, the division of the island into seven kingdoms by the Saxons) and more especially after Alfred's glorious reign, we might expect something better. The country was then converted to Christianity. Churches were wanted and there were Italian priests to be found who could tell the inhabitants what was being done at Rome and elsewhere on the continent. But against this we have the knowledge that the dominant race was Saxon or Danish, and art has consequently no place in their affections. Their churches were probably small and rude, just sufficient for their purposes and no more, and built as we now build railway stations, to last only until increasing accommodations become a positive necessity to satisfy the demands of traffic.

Most probably, too, the greater number were built of wood, and for the true Saxon style, we ought to look, perhaps, to the Norwegian wooden church as its true prototype. The Venerable Bede says, there was a time when not a single stone church existed in all the land, the custom being to build them of wood. Finan, the Bishop of Lindisfarn, or Holy Island, built a church on that island, A. D., 652, for a cathedral, which was not of stone but of

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brated in it but a little more than a year after its foundation. When the work was well advanced, he sent agents into France for the purpose of procuring, if possible, glass manufacturers, who, at that time, were not to be found in England, and to bring them over to glaze the windows of his church and monastery. His agents were successful, having induced several artisans to accompany them. These not only executed the work assigned to them by Benedict, but gave instructions to the English in the art of making glass for windows, lamps and other uses." Before the introduction of glass-makers the windows of private houses, as well as of churches, were filled with linen cloth or wooden lattices.

The historian Henry observes that, "When Alfred, towards the end of the ninth century, formed the design of rebuilding his ruined cities, churches and monasteries and of adorning his kingdom with more magnificent structures, he was obliged to bring many of his artificers from foreign countries. Of these he had an almost innumerable multitude collected from different nations, many of them the most excellent in their many arts." Nor is it the last praise of this illustrious prince, that he was the greatest builder and the best architect in the age of which he flourished.

Ducarel, in his "Norman Antiquities," enumerates some of the churches in England which belong to the ages anterior to the Norman conquest. Among them are those of Stukely in Buckinghamshire, Barfreston in Kent and Avington in Berkshire. Other examples might be cited were it necessary.

The Anglo-Saxon era, though it properly comprised the time between A. D., 600 and 1066; that is, from the conversions of the Saxons to the Norman conquest, is not known with anything approaching certainty from the reign of Edgar in 980 to the last named event, immediately previous to which Edward the Confessor had during his lifetime completed Westminster Abbey in a style then prevalent in Normandy, and with a magnificence far exceeding any other then extant. No less than eighteen of the largest monasteries, all of them Benedictine, had been founded by the Saxon kings in their successive reigns and it is evident that the churches attached to them were their most decorated parts, as respected their architecture.

Mr. Gwilt summarizes the peculiarities of Saxon architecture as follows: "Arches always semi-circular, often plain, sometimes decorated with a variety of mouldings on the soffits as well as on the face, the former being entirely occupied by them. They are found double, triple and quadruple, each springing from two columns, and generally cased with a different moulding, which is frequently double, thus making six or eight concentric circles of them; and as each of them projects from that under it a moulding is placed under them generally the same as that used on the face. Columns—single, cylindrical, hexagonal, octagonal, on square plinths, very few diam-

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openings, hammer-dressed work and unchiseled sculptures. Also the occasional use of rude round staircase to the west of the tower.

From the conquest of England by William of Normandy in 1066 architecture received an impulse, indicated in various styles, which lasted until the time of the Tudors, when it gave way to one altogether different. With the Norman conquest a new state of things was inaugurated. Great tracts of country and a part of the wealth of the conquered people escheated to the conqueror, and in the divisions of the spoil the clergy seem to have been even more fortunate than the laity. But, however, that may have been, it will be easily understood that a French hierarchy, vowed to celibacy, would be able to find no better way to employ their easily acquired wealth than in the display of architectural magnificence. During the century which succeeded the conquest the Saxon cathedrals, with scarcely an exception, were swept away to make room for nobler buildings designed by foreign architects, and all the larger abbey churches were likewise rebuilt. All this was done with such grandeur of conception and so just an appreciation of the true principles of architectural effect that even the Norman nave, in spite of its rudeness, is frequently a more impressive specimen of art than the more polished productions of the succeeding centuries.

The impulse once so nobly given, the good work proceeded steadily but rapidly. During the three centuries which succeeded the conquest all the artistic intellect of the nation seems to have been concentrated on the one art—that of architecture. Poetry hardly existed and painting and sculpture were only employed as the hand-maidens of architecture. Year by year new and improved forms of construction were invented and adopted. New mouldings and new applications of carvings and foliage were introduced, and painting even on glass work was carried to an astonishing degree of perfection. The twelfth century exhibited a rage for building in Britain more violent than has since been seen.

A contemporary writer thus describes it: "The cathedrals and abundance of churches newly built in all parts of the country, the great numbers of cloisters and monasteries, and other residences for the monks that were then raised, sufficiently prove the happiness of England under the reign of Henry I. Peace and prosperity were enjoyed by the religion of all orders who lent their whole power to increase the magnificence and splendor of divine worship. The ardent zeal of the faithful prompted them to rebuild their houses, and especially their churches, in a more suitable manner. Thus the ancient edifices raised in the days of Edgar, Edward, and other Christian kings, were taken down and others of greater magnitude, beauty, and more elegant workmanship were reared in their stead, to the glory of God."

The architects and artificers by whom the Norman works were planned and executed, were men of great science and skill, and the names of several

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vals. Their shafts are circular, hexagonal and sometimes octagonal on the plan; fluted, lozenged, reticulated, and otherwise sculptured. Sometimes they are square on the plan and then accompanied by portions of columns or pilasters applied to them. Sometimes four columns are connected together without angular pieces. They are much higher in proportion to their diamaters than the Saxon columns, and though some examples are quite plain others are decorated with a species of volute, or with plants, shells, flowers, animals, etc. The bases stand on a strong plinth adapted on its plan to receive the combined and varied forms of the shafts.

Windows are still narrow and semi-circular headed, but they are higher and are often placed in groups of two or three together. Ceilings, usually, if not always, of timber, except in crypts, in which they are vaulted with stone, with groins mostly plain yet sometimes oramented on the edge, but universally without tracery.

Walls were of great thickness with but few buttresses and those of small projection; flat, broad and usually without ornament.

Ornaments: Among these must be first named the ranges of arches and pilasters which had nothing to support, and which were intended to fill up void spaces, internally as well as externally, for the purpose of breaking up large masses of surface. The most common ornaments for arch mouldings and belt courses were the chevron or zigzag moulding, the embattled frett, the triangular frett, the nailhead, the billet, the cable, the hatched, the lozenge, the wavy, the nebula, and the pellet moulding, nearly all of which had been used in Saxon architecture. Sometimes carved heads are observed in the spandrils of arches, in capitals of pilasters, and in corbels of arches. These are mostly of grotesque forms with very little resemblance of the human head.

The churches of this period always had transcepts and a tower at the intersection of the nave and transcept, loftier than heretofore but without spires. The eastern or altar end of the churches was circular.

Though much of the Saxon style was retained, there is from the greater size of the edifices of this period a much more impressive air of magnificence than had before appeared. We have thus pointed out some of the peculiar characteristics of the Norman period, and will merely add that the Norman architects by the lengthened vista of the nave, uninterrupted by the choir screen, produced a sublime and imposing effect by the simple grandeur and amplitude of the dimensions of their churches.

Many of the English cathedrals show evidences in their design of having been built during a period of transition, their entrances, crypts, and in fact the entire lower portion of the building being Norman, while their upper parts are of pointed architecture; that is, the arches rise above a semi-circle. The same or similar characteristics may be observed in the churches or

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[illegible] the same period in Germany [illegible] that the Lombards travelled [illegible] and were [illegible] the [illegible] but were just [illegible] wages [illegible]

[illegible] further North-western America [illegible] more [illegible] [illegible] Norman [illegible] [illegible] Norman [illegible] [illegible] has also [illegible] [illegible] Norman [illegible] [illegible] [illegible]

pole, and afterward of John Carter, an eminent artist and architect, a better taste was formed and this led to the appreciation of that which is indeed the English National style.

Pointed architecture has by common consent become divided into three periods: Early English or lancet, in which the arches are very pointed; decorated or equilatrial, in which the radius of the arches is equal to the width of the opening; debased or perpendicular, in which the arches are four centered, or fall below the equilatrial arch. The character of each period is quite as much determined by the tracery of the windows as by the forms of the arches.

We shall first consider the Early English, or lancet period. Says Mr. Gwilt: "During the reign of Henry III. alone no less than 157 abbeys, priories, and other religious houses were founded in England. Several of our cathedrals and conventional churches, in a great part belong to this period, in which the lancet or sharp pointed arch first appeared in the buildings of this country, though on the continent it was used nearly a century earlier. The great wealth of the clergy, added to the zeal of the laity, furnished ample funds for the erection of the magnificent structures projected. But it was with extreme difficulty that the workmen could be procured to execute them. With the popes it was, of course, an object that churches should be erected and convents endowed. It was in the course of this period that sculpture was first made extensively available for architectural decorations. The cathedral, conventual, and other churches built in Britain began to be ornamented on the outside, statues of various dimensions in basso and alto rilivio. They were not equal in execution to those in France, which have also had the additional good fortune to have been better preserved, from their exposure to the seasons less inclement, and to an atmosphere less impregnated with the smoke of coal."

The characteristics of this style are that the arches are sharply pointed and lofty in proportion to their span. In the upper tiers two or more are comprehended under one, finished in trefoil or cinquefoil instead of points, the separating columns being very slender.

Columns on which the arches rest are very slender in proportion to their height, and usually consist of a central shaft surrounded by several smaller ones. The base takes the general form of the cluster, and the capital is frequently decorated with foliage very elegantly composed. The windows are very long, narrow and lancet shaped, whence some writers have called their style the lancet Gothic. They are divided by one plain mullion, or in upper tiers by two at most, finished at the top with some simple ornament as a lozenge or a trefoil. They have commonly small marble shafts on each side, both externally and internally. (In this country the shafts, if of stone, are cut from same material as the rest of the building, but more frequently

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... shafts are ... wood and form a part of the wooden frames and tracery ... R... are high ; the bed and ... ranges are vaulted exhibiting the best examples ... the ... ogive only which in a short time ... to the ... ...

modest, example of Early English. In its restoration, after having been burned, its character was slightly changed, especially in its new east window, which gives it a tendency toward the decorated style.

Calvary church, on Delaware avenue, also has some of the peculiar features of the Early English style.

The fourth period of English architecture, or the second period of Gothic, or pointed architecture, begins about 1300 and lasts until about 1460, or from the reign of Edward I. to that of Richard III.

As our time will not permit a full and complete description of the decorated and perpendicular style, we will only add a few quotations. The following from the Encyclopedia Brittanica will be all that our space will permit:

"The transition from the simplest early pointed to a more advanced style can be seen as well in the Westminster Abbey as anywhere. Here traceries began to take the place of simple lancet openings and led to that system of window tracery which was, in fact, the distinguishing feature of the succeeding style.

"When the invention of tracery was complete, everything in Gothic architecture changed rapidly. The art of masonry and stone-cutting rapidly developed. Moulded stones from being made continuous round the intricate combinations of window tracercies came naturally to be used much more largely than before in place of simple bearing shafts. So columns came to be formed of clusters of mouldings, and in the case of groined buildings each moulding of the shaft was developed into more mouldings above the capital, or even frequently carried to the vault without any capital at all. Traceries were commenced first of all by merely piercing geometrical patterns or circles through the thickness of the walls. Then these patterns were combined under one inclosing arch; and then when this sort of tracery had reached perfection it was found possible to vary it indefinitely by making use of double curves, and then, when these had been used for a little time, flowing lines wandering gracefully over the space to be filled, and sometimes drawn by hand, supplanted the more formal outlines of the earliest work. The difference was great between an opening which was made with a sole view to the opening for glass, and one which was the accidental result only of the pretty lines and curves made by regarding the monial of the window, and not the light as the thing to be considered. The tendency of the modification was to make men think lines of more importance than masses, and whether consciously, or not, this is just what happened. Not only window traceries but mouldings, carvings and every other feature were entirely changed in character. The soft gradations of the early mouldings were given up for combinations of more hardly defined and thinner lines of light and shade, and, in harmony with this change a crisp and sharp imitation of natural foliage

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enriched by a multiplication of surface ribs, were now most elaborately enriched by cross ribs sub-dividing the simple spaces naturally produced by the intersection of necessary ribs into small panels. These again were filled with tracery, and finally the keystones were formed into pendants and the branching so radiated as to produce the really beautiful and very English variety of groining called fan tracery."

The amount of skill shown in the construction of these vaults was very great, and more of them have proved this author's science by the perfect way in which they have endured to the present time. In other respects the architects of the fifteenth century were successful. Few things can be more beautiful than the spire of Gloucester cathedral and many of the open timber roofs are superb.

After the middle of the sixteenth century the practice of Gothic architecture in England gradually died out, being in a large measure superseded by the Italian Renaissance, yet good, sound, solid and simple forms, well constructed by men who respected themselves and their work, and did not build only for the passing hour, were still popular and general, so that the national architecture to a late period was often good and never absolutely uninteresting.

We have followed what, with propriety, might be called English architecture through its various stages from the commencement of the Saxon period until the introduction of the Italian school, when, for a period, pointed architecture went into disuse. In more recent years, however, this form of architecture has experienced a revival and now many of the most beautiful churches and public buildings of Great Britain and her colonies are being erected in this national style of architecture. The new Parliament houses in London, many of the city halls of England, the Parliament house of Canada at Ottawa, and public buildings, postoffices, etc., of Australia, are all of them of this style, modified as a matter of course to suit the requirements of the public and the taste of the present century.

The influence of the English national style of architecture has been sensibly felt in our own country. We, as a nation, have no peculiar style of architecture, but we turn with loving remembrances to the homes of our ancestors and bring from them whatever is good and beautiful in art and architecture, and whatever is useful in the sciences. These we transplant to our American homes, changing them to suit our requirements, beautifying them to suit our taste, and thus naturalizing them to our soil.

With us the English pointed architecture has a charm and has been almost universally adopted as the style for our best and most beautiful church edifices. And many of our architects can now handle it with the precision of the old masters. In a modified form the English style is well

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adapted to school architecture. The University of Chicago now in process of construction partakes to a greater or less extent of this modified style.

While we need not look for the adoption of any one style as a national architecture, we have reason to believe that the architectural styles of England, especially its pointed styles, will eventually become the prevailing style of the country for our ecclesiastical and educational edifices.

Cyrus K. Porter

THE HAWKINS WIFE



THE HAWKINS wife was a mother [illegible] an [illegible]
[illegible]
[illegible]
[

THE PETRIFIED MAN.

THE annual report of finding the body of a petrified man is in circulation. This time Perry, Iowa, is given as the locality and J. K. Old, a real estate dealer, as the discoverer. Thrilling accounts are written accompanied by graphic pictures illustrating the purported find. We quote from one of the many accounts in circulation, and if the various accounts do not agree more closely than the separate paragraphs below they will have little weight as evidence that a body in any condition was found, much less that it was mineralized as Dr. Miller is reported to have said:

"He was either murdered and buried in the bed of the creek from whence his body was recovered, or else he was put to death many years ago by the Indians long before civilization reigned in that section. This is evidenced by the fact that the back of his head is beaten in, while everything else about the body shows the man was in perfect physical condition. *The petrified body was found partially submerged, only the arm protruding.*" [Note that it was found partly submerged in some stream, according to the correspondent.]

Dr. E. J. Miller, of Perry, is reported to have testified as follows: "I was present when the body was taken from the ground, and was one of the physicians who thoroughly examined it a few hours later, and from the facts brought out in the examination I unhesitatingly express my opinion that it is a genuine specimen of limestone petrification. The body was taken [Note what follows] from the side of a bank about three feet from the top of the surface and directly from under a tree which had grown to a height of nearly twenty feet. A number of the roots of the tree were entwined about the body and had to be cut before it was removed. The body was carefully lifted from its long resting place and Dr. Aiken, of this town, took charge of it and brought it to this city, where a committee of four—Drs. Aiken, Trouth, Mower, and myself—subjected the specimen to as careful an examination as was possible under the circumstances. * * * The teeth, which can be seen where a part of the upper lip was removed, are perfectly natural and well preserved. To discover the nature of the petrification, after various other tests, I attempted to drill into the body. At a depth of seven inches the point of the drill was broken off. I exposed the dust taken from the operation to the action of powerful nitric acid without noticing any effect whatever. The body weighs 320 pounds, and I consider it a perfect specimen of genuine limestone petrification."

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ENGLISH AND AMERICAN ROLL TRANSMISSIONS

[illegible]

ent rope belts, because it is impossible to regulate or limit the amount of stretch of each one.

It is also impracticable to apply tension devices separately to a number of rope belts running side by side, close together, and it is useless to apply such a device, common to all the several ropes.

Hence, it became necessary that the rope should be heavy to insure proper pressure and adhesion to the wheels by its own gravity. To accomplish that end with uniformity as to the driving and driven wheels, it becomes necessary that driving and driven shafts shall be both horizontal, not far from the same level, and at a considerable distance apart. Under these favorable conditions the English system is efficient and economical, but the limitations prevent its application in any place where such favorable conditions are not attainable.

In 1885 Wallace H. Dodge, in America, proposed to employ a single endless rope in multiple wraps, and to apply thereto a proper tension device, thus at one stroke eliminating the limitations of the Swiss and English systems, and making the rope universally applicable for all power transmission purposes, regardless of distance and direction.

According to the Swiss or English systems, if the power to be transmitted is too great for a single rope of practicable size, then two or more ropes are employed, running in grooved wheels side by side. According to the American system, as above outlined, under the same conditions, instead of two ropes, a single rope is carried two or more times around both driver and driven pulleys, and finally by means of a third wheel it is conducted from the last groove back to the first groove, and the ends joined to constitute an endless rope for the entire system.

By mounting the third transfer wheel upon a movable carriage, and hanging a weight to this, it becomes also a tension device, capable of taking up the slack, equalizing the strain on all parts of the rope, and allowing a perfect compensation for hygrometric or other disturbances which affect the length of the rope.—*R. D. O. Smith, in Cassier's Magazine.*

ELECTRIC STONE CRUSHING.

WHEN the summer travel of next season begins the Hartford Street Railway Company will have in its Newington line almost the only suburban line in the country which is completely stone ballasted, says the Hartford (Conn.) *Post.* The line is already nearly ballasted with stone to Newington Center, but the final work will not be done until next spring, after the final settling of the track. Incidental to the ballasting of this line, but really to the general reader most interesting, is the means employed to do the work. The rock, which is made the track foundation, was all crushed by electricity and hauled to its dumping ground by electricity.

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A large flat car was procured and a steam crusher was built and set on the car. At the other end of the car was placed an electric motor to operate the crusher. The crusher was hoisted up to the level of the track by means of a platform. Just as the last was put in place, at the end of the track from a spur track from the main line. When the car had been loaded the steam engine was put on the car. Wherever the track turned about the curves, heavy timbers were placed under the rails. These were put in place, after the car had been loaded, and the crusher and steam engine were moved to the end of the track. The engineer of the crusher and steam engine wants more stone or more men to handle it, the engineer can signal with a whistle to the men and the car moves forward. From time to time the engineer moves the brakes and moves the car forward, at the end of the spur track where it meets the main line. Upon the spur track the car is moved back and forth as the work progresses and when it is finished it is moved on to the main line.

The crushed stone is carried in cars to the point where it is to be used. It is dumped from the cars and spread by men with shovels. It is then rolled with a steam roller, which packs it down and makes a smooth surface.

MONEY IN MONUMENTS

THE [illegible] of the [illegible] is [illegible] of the [illegible] and [illegible] [illegible] [illegible]

BUILDING REGULATIONS IN GERMANY.

APROPOS of the much-discussed and widely agitated subject of tenements and high buildings in the United States, especially in the city of New York, where many of the new office buildings are 300 feet or more in height and built on the steel-skeleton plan, veneered with masonry, and in view of the assertion that the exclusion of light and air from the narrow streets must affect the health of the city, a few of the recently adopted laws governing the building of tenements and dwelling houses for those of moderate means in Germany may be of opportune interest to Americans.

The government of Saxony is making every endeavor to better the condition of tenements and moderate-priced dwellings in Saxony, from a sanitary point of view as well as in a social-political respect. These efforts are due to the increase of population in many of the cities and their neighboring communities. In a recent decree, the boards of public works, or "Baupolizeibehorden," have been instructed to prevent as much as possible the building of ordinary tenement houses, and also to take all possible measures to provide the man of small means with good, healthy, and comfortable lodgings. The Ministry of the Interior has therefore thought it appropriate, after hearing the arguments of the board of health, to form a set of resolutions, the most important of which will be of general interest. The Saxon government directs that in the laying out of new streets and sites for dwelling houses, builders must choose a position where direct exposure to sunlight may be had, not only in front but at the rear of the site as well; therefore closed streets (streets with houses built in rows) shall be laid out from northeast to southwest or from northwest to southeast. Of course, in laying out building plans for the arrangement of street lines, the special local conditions and hygienic demands are always first considered. Another important feature in the plans for building, especially in the erection of large dwellings, is the provision of squares in a sufficient number and size, as well as front gardens, with the culture of trees. Above all things, the boards of public works shall prevent, under all possible circumstances, the erection of new tenement houses, although they cannot in all cases be entirely excluded. For this purpose the authorities have arranged certain measures for the width and depth of a dwelling house of about 15 by 13 meters (about 49 by 42 feet), which, as a rule, must not be exceeded. The regulation governing the supervision of sleeping apartments in all kinds of dwelling houses,

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BARRIERS TO PROGRESS.

IN the course of an address before the Bankers' Club, of Rockford, Ill., Mr. D. B. Dewey, vice president of the Bankers' National Bank, of Chicago, referring to the labor agitator, said:

To be fair, we must admit that labor has foes in the ranks of capital—a fact deplored by every honest operator or owner of wealth; but labor's supreme foe is found among its unprincipled agitators. These designing men play upon the passions of the ignorant and the prejudices of the poor, whose necessities denied or aspirations crucified make them rebellious against their fate, envious toward the prosperous and ready victims of the agitator's perfidy; thus strikes are instigated and prolonged, wasting millions of money, time and labor, and, worse than all, entailing suffering beyond estimate.

Enforced idleness is pregnant with danger to society—property rights are ignored and property destroyed; social usages abused, with revolution and bloodshed possible.

The edict is cruel which permits a man eager honestly to earn bread for himself and family to fall into hopeless poverty. The government should protect a man willing to earn an honest dollar and punish the man or set of men who dare deny him this privilege. The conditions prohibiting a man to labor are born of a spirit of ignorance and despotism. Ignorance in its madness becomes the personification of brutality, and under the white heat of passion would plunge its victim into the vortex of ruin, were it not that reason stands as a signal light warning against danger.

In this age no man is so poor that the plea of ignorance is justified.

Labor agitators take prominent exceptions among the owners of capital as a standard by which the whole shall be judged, thereby infuriating prejudice against capitalists as a class. No man knows better than the conscientious owner of wealth that a bad man in control of money may become a tyrannical brute; that when miserly avarice takes possession of the soul generous impulses wither like flowers under the autumn frosts; that God is always forgotten in idolatry for gold; that sordid greed ever has and ever will ruthlessly tread upon bleeding hearts, defeated hopes and throttled justice.

In suggesting remedies whereby the strife between capital and labor might be ameliorated, if not completely removed, he said:

If I had the power, I would for the settlement of these labor problems appoint a national arbitration board, composed of the highest-minded leaders of labor and the wisest representatives of capital, to whom all differences between capital and labor should be submitted for adjudication and whose decision should be final, thus securing equity between interests where there never should be impassioned conflicts, and averting idleness, bloodshed, poverty and suffering.

* * * * * * * * * * * * *

I would also make it impossible for colossal fortunes to be perpetuated intact in one person or family. Legacies for the perpetuity of the massive and dangerous power a vast sum of money gives should be limited to a reasonable percentage of great wealth.

* * * * * * * * * * * * *

I would impartially enforce the law, whether economic, civil or criminal. I would encourage wise organization for the protection of both capital and labor—organization where capital recognizes the economic equities and labor leaders are truly seeking protection for wage-earners. Organization is a necessity for the preservation of law and order and for the adjudication of differences.

"I think your magazine is all right."—*O. Hurst, Ft. Hunter, N. Y.*

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TROUBLE IN THE UNIONS

[illegible] between the Soft Stone and the Granite Cutters Unions over [illegible] on the Chicago Federal Building still continues [illegible] and the soft stone cutters in the lead, save the Washington [illegible] Mr James P McHugh general secretary treasurer of the Soft Stone [illegible] regarding the matter says substantially that the Building [illegible] Washington at a recent meeting took up the case [illegible] the Granite Cutters and wrote a very emphatic letter [illegible] ordering him to Chicago and interesting the Central [illegible] of the Chicago stone cutters Mr McHugh stated [illegible] letter he received in which he said to have the stone cutting [illegible] the men were receiving better wages and better [illegible]

[illegible] Building Trades Council took action and wrote [illegible] Washington stating that unless the Granite [illegible] When these men read the letter they [illegible] [illegible] Washington [illegible] [illegible] [illegible]

be forged as nearly as possible to the required shape. When cool they should be ground or filed to shape. The hardening is accomplished by suddenly cooling the piece which has been heated to the temperature ascertained by experiment to give the most satisfactory results. The testing may be done by heating the steel to a low heat and plunging it into water and then trying it with a fine file. If it is not hard enough, heat it a little more and try again until a temperature is obtained which will harden the steel so that it will resist the file or scratch glass. Be careful to avoid overheating. Underheating, too, is unsatisfactory, because there is a point below which steel on being suddenly cooled will not harden. Do not overheat. Do not heat unequally. Do not "soak" the steel in the fire. When cooling keep the steel moving about.

COLORS IN TEMPERING STEEL.

		Fahr.
Very pale straw yellow A shade of darker yellow	for tools and cutters of metal	430° 450°
Darker straw yellow Still darker straw yellow	for edge tools, taps, etc	470° 490°
Brown, yellow Yellow tinged with purple Light purple	for saws, hatchets, etc	500° 520° 530°
Dark purple Dark blue	for springs	550° 570°
Paler blue, too soft for above purposes		590°
Still paler blue, too soft for above purposes		610°
Still paler blue, with tinge of green, too soft for above purposes		630°

Having obtained a satisfactory degree of hardness, polish the surface and proceed to temper. With regard to this process it may be said that the result depends not on the method adopted, but on the degree of heat to which the article to be tempered is brought. There are many ways of softening. Carriage springs are tempered by "blazing off"—that is, their surfaces are covered with tallow or oil and heated over the fire until the tallow "blazes," which it will always do when at a certain temperature- Or they may be tempered by heating until they will burn a piece of wood of medium hardness. Small tools and cutters are tempered by laying them on a bar of hot iron until the desired color appears, when they are removed. It is not necessary to cool them off. It is a good thing not to be in a hurry, the slower and more uniform the temper the better the result.

The water for hardening should not be cold, and clean water free from grease is the main thing.

HINTS TO DRAUGHTSMEN.

DRAUGHTSMEN, as well as others, have their little kinks, and the publishing of these kinks often helps others. A practical draughtsman gives the following simple suggestions, which will likely prove useful

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...ammonia ... In mixing up inks the process is very much expedited by ... heating the dish and water in which it is mixed before commencing. It ... prime in the summer that the flies walk over a tracing and eat off ... a very perplexing manner. The use of vinegar instead of water ... prevent this. In making a tracing the cloth will take the ink much ... better when covered with chalk. Tracing paper that has been ... may be ... bleached out effectively and enjoyed ... by drawing it over ... a table or drawing board, holding it down meant me with an ... have observed made. Where there are a large number of drawings ... kept a great deal of trouble and confusion can be avoided by ... drawings on extra standard sizes. It ... the ... then the next larger size would be equal to ... ... This enlarging or reducing may be carried ... circumstances require, but it is altogether best to ... ... having process if possible. One of the advantages ... drawings is that they may be kept in a case of drawings the ... made to accommodate the standard sizes determined upon ...

BUILT TO STAND FOREVER

A ... demonstration, which is said to have been ... in the early part of a century ago came to light to ... ... the attempt to strengthen the ... ... After the object had been examined by an architect and the ... ... taking it down with the view of rebuilding the ... ... was made that stones must be taken down exactly as they ... ... with a cement of melted lead and sand which ... ... to separate the stone from each of the ... ... at the end of ... ... was erected in a similar manner ... ...

was $144,708,810, while its personal property had decreased to $44,735,670; or, in other words, while the personal property of Cincinnati returned for taxation in 1866 was greater than the returned amount of real estate, the amount returned in 1892 was only about a quarter as much as the real estate; and yet during this quarter of a century the city of Cincinnati nearly doubled its population, and undoubtedly increased its wealth in a far greater proportion. In the city of Boston the value of the realty returned for taxation in 1868 was $287,635,800, and of personalty $205,937,300. In 1890 the corresponding figures were, realty $619,990,275, personalty $202,051,525, a disproportionate gain of realty of $417,938,750.

In the State of Massachusetts in 1862 personalty was assessed at $309,000,000 to $552,000,000 of real estate, or in the ratio of fifty-six per cent of the latter. In 1891 the personalty was $556,000,000 to $1,679,000,000 of real estate, or in the ratio of thirty-three and a third per cent. That is, the personalty of the State in twenty-nine years increased only $247,000,000, while the real estate increased $1,127,000,000, or nearly five times as much in the same time. "This simply means that more and more personal property, under the rigid tax system of Massachusetts, escapes taxation. The real estate cannot have increased in value without an increase in personal wealth with which to increase the demand for it. Real estate does not make a demand for itself." In 1870 the personal property of the entire State of Massachusetts returned for taxation represented an average of $345 *per capita*. * * *

The net result of all the comparisons made by the Ohio commissioners between city and farming districts finally goes to prove that the tax upon personal property makes farmers pay from four dollars to seven dollars where it makes the residents of large cities pay one dollar.

Speaking generally of the effect of this Ohio scheme of taxation the commission further says:

"The system as it is actually administered results in debauching the moral sense. It is a school of perjury. It sends large amounts of property into hiding. It drives capital in large quantities from the State. Worst of all, it imposes unjust burdens upon various classes in the community; upon the farmer in the country, all of whose property is taxed because it is tangible; upon the man who is scrupulously honest; and upon the guardian, executor, and trustee, whose accounts are matters of public record. These burdens are unjust because by the system as administered these people pay the taxes which should be paid by their neighbors." And the commissioners finally add that "these conclusions are in accord with all current authorities on the subject."—*From Principles of Taxation*, by HON. DAVID A. WELLS, *in Appleton's Popular Science Monthly of December.*

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EXPORTS DECLARED

Returns from Consular districts for quarter ended

[illegible]

[illegible]

[illegible]

STABILITY OF LAND TENURES.

To the Editor of STONE:

SIR:—Referring to the recent decision of Secretary Bliss regarding marble as a mineral may I ask your opinion in the following case:

Under the homestead law a man takes up and finally receives patent for 160 acres of land, known as agricultural land, and used by him for agricultural purposes. Part of the tract contains a deposit of limestone and marble which afterwards proves to be of more value as building material than the entire tract is for agricultural purposes. Now, this discovery being made, is it possible for the property, or any part of it, to be devised away from the party holding patent, or is it necessary for him to take other steps to secure his title, and if so, what?

Is there any restriction to his selling the part containing the building stone, or to his quarrying or selling the stone? H. M. D.

The opinion of STONE on a question of this nature would simply be an argument on the equity of the case. We have seen no decision on the case in point. In anticipation of this, we are of opinion that no return of land entered under the homestead law would be required. We believe it will be held that exception will obtain only on lands entered under the mining laws. It would manifestly be unjust to the holder of lands under homestead grant to take from him what has been given to him for an explicit purpose, and which he has continuously used for that purpose, until discovery has made them valuable in other respects. In other words, if an exception is not nominated in his deed, the homesteader should be entitled to the benefit of what his land produces. There are, no doubt, many original homestead grants that are now, and for years have been, worked as quarry lands, and at same time for agricultural purposes.

THE NEW PENNSYLVANIA CAPITOL.

WHILE Architect Cobb has been given all necessary information by the Capitol Commissioners to enable him to proceed with the requisite drawings without further interruption the material for the exterior of the building has not been decided on, says the Philadelphia *Times*. The commissioners are unanimously in favor of the use of stone, but no conclusion has been reached as to its character. Granite would be promptly selected, but for the fact that owing to its hardness it cannot be prepared for the walls as rapidly as other stone. Marble is among the stones being seriously considered by the commissioners. Either would be acceptable to the architect. Information from Mr. Cobb is that he has all his available force busily at work making the necessary drawings for the Capitol building and that they will be finished by the close of the year.

The Capitol Commissioners do not seem to attach much importance to the talk that the invited architects, who were promised $1,000 each for their designs, will probably sue for the money. If such action should be taken they are apparently ready to meet it with the certainty of success. Their

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[illegible] to pay these architects is based on section 12 of part 1. of the programme in connection with the opinion of the Supreme Court in construing that document. The section reads thus: "It is stipulated that a competitor who violates [illegible] all privileges under this programme who shall violate any of the conditions governing this competition." The commissioners claim that their decision in the matter was based on the recent opinion of the Supreme Court.

Under the awarded programme the erection of the "legislative building" the Capitol and four additional structures for department and other purposes were projected to be constructed for a little over $1,500,000, exclusive of the [illegible] furnishings, interior mural decorations, apparatus for the actual [illegible] heat and light and the grading and embellishing of grounds about the legislative building.

Notwithstanding the various buildings in one grand structure much expense can be saved. It is believed by the Capitol Commissioners that the cost of the aggregate of the improvement will not vary much from the estimate [illegible] in the original programme even with a massive and magnificent [illegible] of the building.

THE CANADIANS AND RECIPROCITY

CANADIANS have a far greater interest in reciprocal trade than we can have in the United States. They form a thin and narrow fringe of people, a few more than a million and a quarter, [illegible] with the eastern and western seaboard at their backs. Their natural trade centres are in the United States. There are very few points in the fringe of population which are more to the large American cities than to any one local centre in Canada. New Brunswick and Quebec would trade with Boston and New York, [illegible] Ontario would trade with Chicago and Minneapolis. Manitoba would trade with St. Paul. Minneapolis and the [illegible] the new mining region of the eastern part of British Columbia would trade to Spokane, Seattle and the western part of British Columbia would trade with Portland, Seattle and Tacoma. There can be no doubt that [illegible] trade were established between Canada and the United States Canada would gain far more than we would. It is the very reason that the manufacturer and natural resources of Canada are worth far more than those of America. It would [illegible] the Canadian advantage that the manufactures of our Northern States would [illegible] Canada. But it is vital to the welfare of the Canadians that they have the United States for a great outlet for their agricultural products, and for the latter in their trade. They have tried hard to [illegible] [illegible] manufacturing [illegible] but [illegible]

and have secured friendly assistance from English statesmen, but every Canadian knows that the markets which lie at their doors, right across the international boundary line, are worth far more to them than all the markets across the Atlantic.—From the "New Canadian Reciprocity Treaty," by E. V. Smalley, in *American Monthly Review of Reviews* for December.

KEEP PEGGING AWAY.

THE recent discoveries of gold in Alaska, in California, in New Mexico, in Canada, and in Old Mexico have caused much excitement among the unemployed. Many have gone to Klondike and many more are going in the spring. The other fields spoken of above are attracting more or less attention and discussion. The Alaskan field has yielded fortunes to a fortunate few, and, as the adventurer is by nature a gambler, he will not hesitate to stake health and even life itself in a wild rush for wealth. Cold, hunger, thirst, toil, privation, sickness, even death itself, are counted as nothing compared to the chance of getting gold. Thousands have gone to Alaska to seek it, and tens of thousands more will go. How many will return successful remains to be seen; how many will return at all?

While awaiting the passage of winter and the advent of spring, STONE'S advice to all is to keep hammering away in the quarry and shop, and when spring comes roll up your sleeves, spit on your hands, take a fresh grip on sledge and crowbar, keep the gadder and channeler and planer and polisher at work and our guess is, you will have more money, more happiness and more honor than if you had gone to the Arctic gold fields.

A SWEDE marble quarryman living near Proctor, Vt., recently was the victim of a strange accident, while riding his bicycle from Center Rutland, home. Wheeling along, his wheel was suddenly lifted in the air, the Swede with it. The wheel was badly injured, and the rider sustained slight cuts and bruises. A hole was made in the ground and it was discovered the wheelman had run over a dynamite cartridge, and it had been exploded. Tires were torn from the machine, and fragments were scattered for some distance. The Swede thought a shot had been fired at him by some highwayman, and he would be robbed. An investigation was made and fragments of the cartridge found.

WEST CHESTER, Pa.—John Rubi, an Italian, 40 years of age, was instantly killed by the premature explosion of a pile of giant powder at the Knickerbocker lime quarries, East Whiteland, and his mangled body was blown thirty feet into the air. The powder had become frozen, and a fire was built to thaw it out. Rubi was standing within six feet of the spot, and as he turned to run to a place of safety the explosion occurred. He had been following the occupation of a blaster for six years, and was regarded as a safe man with explosives.

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OUR FOREIGN TRADE IN STONES, ETC.

[illegible]

[illegible]	SEPTEMBER		[illegible] SEPTEMBER	
	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]

SELECTED MISCELLANY.

CENTER OF GRAVITY OF A CYCLE.

WHEN two-thirds of the weight of a rider and his machine are carried on the rear wheel, the center of gravity will lie in a vertical line drawn one-third of the length of the wheel base forward of the rear axle, and will be, according to experiments made by Wallis-Taylor, about at the saddle. In coasting he found the center of gravity to be highest. He says: "Were a great obstruction to be encountered, with the rider's feet in position at the top of the forks, his body would be prevented from leaving the machine, the whole weight being raised through the distance of one foot and taking a header; if, however, the rider had his feet on the pedals, he would be simply projected over the handle-bars, the machine remaining behind, the striking energy imparted to the mass being that due to the motion of weight of wheel only, and the cycle would probably remain comparatively unhurt instead of being wrecked, as in the former case.—*L. A. W. Bulletin.*

CORAL ROCK FOR BUILDING PURPOSES.

NATURE has made it easy to build houses in Bermuda. The entire group of islands is made up of coral rock, so that every man can have a quarry in his backyard if he cares to dig deep enough. This stone, when first cut, is soft and white and can be got out in square blocks with an ordinary handsaw. On exposure to the air, however, it soon becomes dark and hard. As there is no lumber in Bermuda, except that which is brought from Canada at considerable expense, stone is used for nearly the entire house. The walls are laid of blocks about eight inches by six and two feet in length. Window sills and door jams are also sawed out of stone in the proper shape, and even the roof is covered with stone shingles, which are made by simply setting a block of soft, fresh stone on edge and sawing it into thin slabs. Both roof and walls have to be kept whitewashed, or the stone would crumble away; with this precaution it finally becomes hard and lasts a long time.

Coral islands are formed by the coral polyps, or insects, which build up reefs to about the level of the sea and then die. On the rough surface of these reefs seaweed clings. The wind and the waves work together to grind up their substance and pile it in heaps of sand, which finally solidifies into the rock that can be cut so easily. The freshly broken stone makes admirable road material. Even the rubber tire of a bicycle will crush a piece of it flat, and the rain soon solidifies it in that shape, so that the whole roadbed, new stone and old together, becomes like a smooth track cut in solid rock.

TO EASILY FIND GEAR AND SPEED.

THE following simple rules can readily be used by any wheelman:

1. *To find the gear of your wheel.*—Multiply the number of teeth of your front sprocket as follows: By 4 if your rear sprocket has 7 teeth; by 3½ if your rear sprocket has 8 teeth; by 3⅛ if your rear sprocket has 9 teeth; by 2⅞ if your rear sprocket has 10 teeth.

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[illegible] the number of teeth on your front sprocket by five and divide the product by the number of teeth on the rear sprocket. Then count your pedal revolutions for one minute and the number obtained in answer to the problem, and the result will be your speed in miles per hour. [illegible]

LANDLORDS IN LAHORE

[illegible] long and have reasons [illegible] to hearing [illegible] [illegible] [illegible]

It stands at present on the Monte Citorio, where it was placed in 1792. Its whole height is about 110 feet, and without the base about 71 feet. Another obelisk was brought to Rome by Caligula. It stands at present in front of St. Peter's, where it was placed in 1586, and its whole height is about 132 feet, and without the base and modern ornaments at top about 83 feet. But the largest obelisk at Rome is that which was originally transported from Heliopolis to Alexandria by Constantine, and conveyed to Rome by his son Constantius, who placed it in the Circus Maximus. Its present position is before the north portico of the Lateran church, where it was placed in 1588. Its whole height is about 149 feet, and without the base about 105 feet. There are eight other obelisks at Rome besides those mentioned above, but none of them are of historical importance. There are also obelisks in various other places, as at Constantinople, Arles, Florence, Catania, in Sicily, etc., some of which are works of Egyptian art and others only imitations.

PLACERS.

GOLD mining and gold hunting in North America have always been of a two-fold character. First have come the placer miners, those in search of the "poor man's mine"—a mine that takes only a few dollars of capital to work. With his pan and shovel, his pick ax and scoop, the placer miner wanders over the face of the earth, prospecting for some rich mine that holds its precious products on the surface. Where some mountain stream has coursed down the granite sides of the hills, or washed deep gullies in the valleys, the placer miner looks for signs of gold. The erosion of the rocks by the running water is nature's method of unlocking the rich mineral from the bowels of the earth, and gradually quantities of the yellow metal are piled up at the bottom of some pool or gulch. Here the wandering placer miner applies his knowledge, and tests the contents of the sand and earth. The miners travel in pairs, and every stream and brook, every ditch and pool of water, must be examined as they journey across the trailless mountain sides. The work is difficult and the returns generally scanty and inadequate; but the dream of finding a rich placer mine lures the men on and ever onward, until they finally leave their bones to bleach on some lonely trail or at the bottom of some inaccessible ravine.—*George E. Walsh, in December Lippincott's.*

PARIS HOUSES.

PRACTICALLY, at Paris, where from the nature of the subsoil it is expensive to form cellars, and where the bulk of the houses are built upon the ground without deep foundations, where the land is all freehold, building leases are unknown, and consequently where the interest of the proprietors is evidently to obtain the greatest number of dwellings upon the least possible surface, and the houses, therefore, are generally from six to seven stories high. The lower parts of the houses are built of the roche stone towards the street and up to the first floor, from thence two stories are carried up in *la pierre franche*, and the remainder is executed in lambourde. The party walls are mostly executed of moellon or small coursed stones, of similar natures to the corresponding parts of the façade. The back walls and partitions are of wood, filled in with light rubble and plastered. Such construction is about as bad as can be; the front wall, built of carefully squared ashlar, sinks very little; the party walls, of rubble and plaster, not only sink more than the front, but from the fact that the plaster in setting expands, it becomes necessary to build these walls totally independent of one another. The back walls, of wood framework, shrink still more. It is therefore almost impossible, in the new quarters of Paris where this style prevails, to find a house which is not disfigured in all directions with cracks and settlements of every kind and size imaginable. The mode of using the stone is, however, logical, and merits imitation. The harder and less hygrometric stones are placed at the bottom as being the most fit to resist the

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crushing the girl on the top are not of the same opinion. The lower ground is also very rocky at the bottom and some of the ornaments

The glove and sleeve protection of this are

used also where they had the fruit from them the others were [illegible] where they meet with the atmosphere [illegible] the most subject to their own preservation

THE WINTER'S ARRIVAL IN CANADA

THE RETURN IN MAY

AMERICAN CLIMATE

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equal to the few high grades imported, and much superior to most of the other imported brands.

"The superior excellence of our cement-producing machinery and labor saving devices has placed the American manufacturer in a position far in advance of European Portland cement producers.

"One of the indisputable signs of our own superiority in this respect is that European cement manufacturers are beginning to draw largely upon American cement machinery and are adopting American methods of manufacture. This fact alone must be a complete answer to that remnant of our own consumers which still clings to foreign standards.

"These people simply hold their minds in bondage and place themselves in the position of Pilate when Christ was arraigned before him. 'What is the truth?' said jesting Pilate, and would not stay for an answer. The old saying, 'wise men change their opinions, fools never,' gathers strength when weighed in the light of the facts which underlie the present high state of American Portland cement industry and its methods of manufacture.

"Men who simply cling to foreign cement standards only impose upon themselves. Their number is happily growing smaller and their sphere of influence more contracted in the march of events.

"The American Portland cement industry has a great future before it, inspired by the confidence of the American people. We rest in the assurance that there will be no step backward. Hostile criticism having been completely disarmed can never resume its former vantage ground. Such is the logic of events honestly chronicled."

THE STONE-CUTTER ABROAD.

AN addition to the volume of tombstone literature was brought from Vermont recently by a young Clevelander. It shows a free and easy disregard for the rules of spelling and punctuation that is a little astonishing when we consider its source. Perhaps, however, both the school-master and the stone-cutter were abroad. Here is the inscription just as it appears on the stone:

PRINDEAU
DATHER
of JRBORNINTHE
YEAROF1872DIED
DEC13IN1885AGE
13YEAR3MONTH
GONBUTNOTFORGOTEN.

THE BUILDER'S PARADISE!

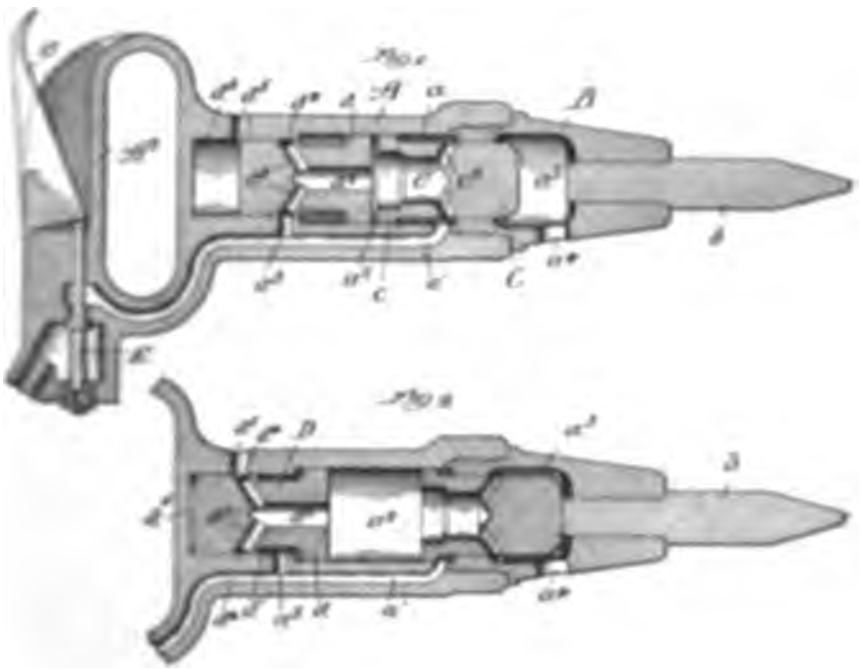
CALCUTTA is now the builders' paradise. The earthquake has injured almost every private house. Tenants are led to believe that the houses they inhabit may collapse and bury them any day; and house owners are in despair as they have no choice but to submit to whatever terms the builder may impose.

It used to be formerly a very keen competition between builders to secure work. It is now a keen competition between house owners to secure builders who will do their work at all upon any terms whatever.

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RECENT PATENTS.

[illegible] MATIC HAMMER



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an opening on its side d^5. B is an extension of the casing A, provided with a longitudinal bore of two different diameters and is pierced at its forward end to receive the shank of the tool to be operated upon. On the side of this extension is an opening or exhaust-port a^4.

To operate on the tool, a reciprocating hammer C is provided and mounted in the bore of the cylinder. This piston-hammer is made of two different diameters, one of which forms a piston-head c, fitting the larger bore of casing A, and the other the smaller bore of extension B, so that an annular fluid-pressure chamber a is thus formed between the cylinder-casing and the piston-hammer. This fluid-pressure chamber is what the inventor terms a "constant" fluid-pressure chamber, and is connected with a source of fluid-pressure supply by means of an inlet-port a', so that fluid-pressure may be admitted to the same to move the piston-hammer to its retracted position, as shown in Fig. 1 of the drawings.

To move the piston-hammer in its opposite direction, so as to perform the striking blow, this hammer is provided with a longitudinal passage c' and substantially radial openings c^2, so as to permit fluid-pressure to flow to the chamber a^3 at the rear of the piston-hammer and move the hammer to a striking position, as shown in Fig. 2. When in the striking position, the longitudinal passage connects the pressure-chamber a^3 with the exhaust-chamber a^3, from which it passes out through exhaust-port a^4.

From the foregoing description of the parts in operation it will be seen that the piston-hammer is moved backward and forward by the direct and expansive force of the fluid-pressure —preferably compressed air. To counterbalance the operation of the piston-hammer and minimize or absorb the shock incident thereto, an auxiliary piston D or plunger is used, mounted in the cylindrical bore of the cylinder-casing. This auxiliary plunger is made of two diameters, so as to provide an inner head d, and a reduced diameter between which and the casing is formed an annular pressure-chamber d'. This plunger is further provided with a longitudinal passage d^2 and radial openings d^3 and an annular groove d^4, connecting the outer ends of the radial openings d^3. The inlet-passage a' is provided with a port a^5, that alternately, by means of the movements of the auxiliary plunger, communicates with the annular pressure-chamber and by means of the groove d^4 with the radial passages in such plunger, so as to act to move the plunger forward when the piston-hammer is being moved backward, and brings its radial passages into alignment with the fluid-pressure inlet or port, as shown in Fig. 1. At this point both of the longitudinal passages of the piston-hammer and the auxiliary plunger are connected with the fluid-pressure inlet, and fluid-pressure is admitted into the chamber a^3 between the same, which, acting directly at first and then expansively, moves the parts in an opposite manner to compel the hammer to do its striking operation and the plunger to balance the shock of the strike almost identically at the same period of time, when the parts occupy the position shown in Fig. 2, and the passages d^3 and c^2 are brought into communication with the exhaust-ports a^4 and d^5 and the pressure permitted to exhaust. It will be noted that when, upon its backward stroke, the rear end of the plunger D passes the port d^5 the exhaust from the chamber d^6 is cut off and the air confined in the chamber d^6 is compressed, forming a cushion and preventing the plunger from striking the casing. If at any time the plunger D should move to any position forward of that shown in Fig. 1, the air-passage A would be closed and the fluid-pressure could be admitted through a' to the annular space a only, which would return both hammer C and plunger D to the position shown in Fig. 1 and the tool would resume operation. The fluid-pressure inlet is provided with a throttle-valve E and a lever e in the handle portion A^2, by which such throttle-valve may be operated as desired.

PNEUMATIC TOOL.

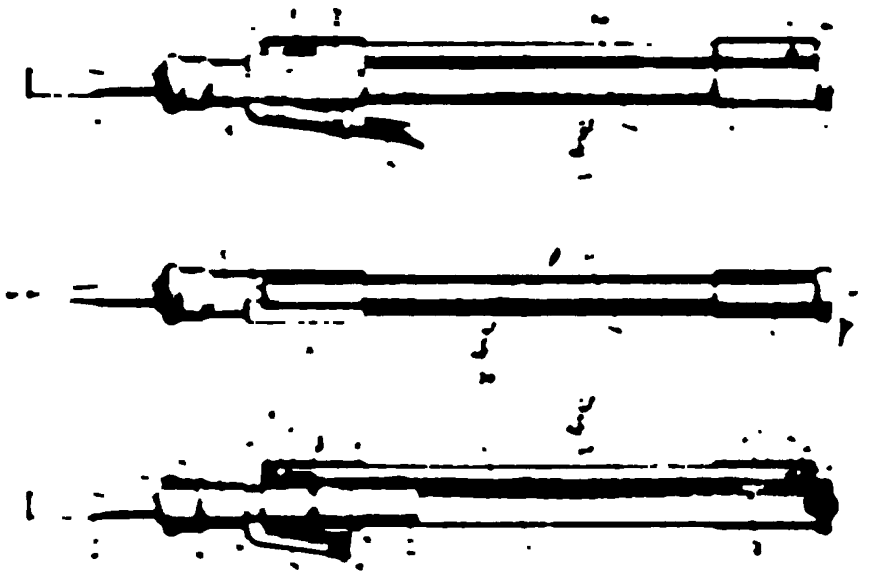
Patent No. 590,661, issued September 28, 1897, to Frank E. Harthan, Worcester, Mass. Application filed June 26, 1896.

This invention relates to that class of percussion-tools which are actuated by the pressure of atmospheric air or other fluid, such as are employed in rock-drilling, stone-dressing, riveting, calking, hammering, or similar operations.

The objects of the invention are stated to be to simplify the construction in this class of tools and reduce their cost, to increase their durability and efficiency of operation, and particularly to enable the force of the blow to be regulated by the pressure of the tool upon the work, to increase the movement of the recipro-

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CONTRACT NEWS.

Paulsboro, Pa.—Architects Stearns & Castor, Philadelphia, are making preliminary plans and sketches for a new church for the Presbyterian Society of Paulsboro. One-story and basement; stone and brick; $10,000.

Newark, N. J.—The plans submited by Architects Jeremiah O'Rourke & Sons, for the erection of the $1,000,000 Catholic cathedral, have been selected by the committee of priests.

Portland, Ind.—Architect W. R. Brown, Cincinnati, O., has prepared plans for a church for the Presbyterian congregation. Stone; slate roof; mantels; $35,000.

Tampa, Fla.—Architects N. J. Clayton & Co., Galveston, Tex., have prepared plans for a church at Tampa. Brick, granite and marble; slate roof; marble and mosaic tiling; marble altars; $125,000. Rev. W, Tyrrell, S. J., Tampa.

Dublin, O.—A masonry dam forty feet high will be constructed in the Scioto river, at an estimated cost of about $100,000. J. J. Dunnand, J. W. Dusenberg, of Columbus, O., are interested.

South Bend, Ind.—James Oliver, owner of the Oliver House, will tear down the old building when the lease expires, May 1, and erect a modern hotel building. Estimated cost, $200,000.

Portsmouth, Va.—Sealed proposals will be received Dec. 14, 1897, for building St. Paul's Catholic church, Portsmouth, Va. Geo. W. Maupin, secretary, Portsmourh, Va.

Stockton, Cal.—Stockton is to have a large beer brewery of the proper equipment to manufacture the best article. Eastern capitalists will build it at a cost of about $150,000.

Rochester, Minn.—The Masonic Temple Association has decided to build a temple.

Albany, N. Y.—Assemblyman Kelley will introduce a bill in the legislature at the coming session, calling for the erection of a State Soldiers' and Sailors' Monument in Capitol Park, this city, at a cost of $100,000.

McKeesport Pa., city council passed on final reading the Mifflin township bridge ordinance and work will begin on the structure in the early spring. The bridge will be built across the Monongahela river from the foot of Market street to Risher station.

Washingtonville, Pa.—The Crescent Brewing Company of Pennsylvania will erect a brewery at this place. Cost $50,000; architect, L. Schriver & Co. Plans at Green's Hotel, 8th and Chestnut streets, in care of Mr. H. Hallman, representing owners.

Menasha, Wis.—In two weeks the bids will be received for the new library building. The plans prepared by Henry J. Van Ryn, of Milwaukee, have been accepted.

Dubuque, Iowa.—The Christian Scientists propose to build an elegant church. Plans have not yet been selected.

Tipton, Mo.—The Tipton Presbyterian Society has purchased a site for the erection of a church.

The Kansas City, Pittsburg and Gulf Railroad Company has decided to build an immense dry dock at Port Arthur, Tex., which, it is asserted, will accommodate the largest United States battleships and ocean liners. The dock will be 550 feet long, 95 feet wide and 27 feet deep, and will cost $250,000. It will be 150 feet longer than the dock at the Brooklyn Navy Yard.

Warren, O.—The West Side M. E. Society has appointed a committee to secure plans for a new church, Rev. H. W. Kellogg, pastor.

St. Joseph, Mich.—The St. Paul's Episcocal Society will build a new church. Rev. H. S. Woodruff, rector.

Rocky Mount, N. C.—A monument is to be erected to the North Carolina soldiers in the cemetery at Winchester, Va.

Cascade, Iowa.—The St. Martin Catholic Society proposes to build a $20,000 church. Rev. L. Roche, pastor.

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MACHINERY AND SUPPLIES.

[Matter appearing under this head is compiled and edited from data furnished by the advertiser, and should not be accepted as the opinion of the publishers.]

PRESENT STATUS OF PNEUMATIC TOOL LITIGATION.

THE statement made by the Chicago Pneumatic Tool Company, that our litigation against the Boyer tool is ended, *is not in accord with the facts.* The original suit is still in progress, aud is being pressed to issue.

The statement of the Consolidated Pneumatic Tool Company, that their patents on pneumatic tools have been sustained by the courts, *is equally unfounded.* No court has passed on any pneumatic tool patent except our Bates Patent, which has been sustained by the court of last resort, and the tools in controversy, pronounced infringements of the same.

So far from being free from litigation, the Consolidated Pneumatic Tool Company is practically the defendant in our suit against Volkening & Co., a user of the valveless tool sold by said company.

We shall also press to a conclusion our suit against the Clement tool, likewise our suits to determine the measure of damages under infringements already judicially determined.

We claim that our Bates Patent No. 364,081 for a Valved Tool, our Bagnasco Patent No. 471,154 for a Valveless Tool, and our MacCoy Patent on the Art, No. 373,746, cover the entire field of Pneumatic Tools.

Certain parties are offering a stone-dressing machine regardless of our patents. We warn the public that the use of such a machine is considered by us an infringement of at least four different claims in our patents Nos. 549,272 and 549,273, covering the said invention.

To any one who will be satisfied with such a stone-dressing machine as they propose to furnish, we would say: We will duplicate their type of machine at 10 per cent. less, *no matter what price they may name for it.*

We offer *valved* and *valveless* tools and stone-dressing machines of unequaled efficiency, *all with unimpeachable titles*, and on most liberal terms.

THE AMERICAN PNEUMATIC TOOL CO.
JAMES S. MACCOY.
844 Washington St., New York.

THE CLEMENT PNEUMATIC TOOL CO., Like the rest of us, has passed through babyhood, childhood, and youth, and has come forth from these different stages of being, purified, strengthened, and fitted for the great battle of life. It is strong in its membership, well equipped for its work, sound financially, and capable of giving a helping hand to every stoneworker in the country. Its president is John C. Kinsey; vice-president, George S. Graham; secretary and treasurer, Edwin F. Glenn; with Henry S. Robins as general manager; J. F. Clement, inventor.

With all the different pneumatic tools now in use, it is rather curious that the patents granted Dr. Clement were granted without a single reference to any other pneumatic tool in use. The claim is that this tool is more simple and more perfect in its construction than any other. The letters in the hands of the company show that it is giving satisfaction wherever sent, not one complaint being received, while additional tools are continually asked for. Owing to new and improved machinery recently installed, four times as many tools can be turned out, and turned out to perfection. Their equipment is complete.

The company are not in business to send out tools in any number at any price, but seek to have a reputation for making a good article, properly constructed, to give satisfaction to the workman and profit to his employer.

We refer to their advertisement in our pages with pleasure, and users of pneumatic tools should not miss it.

The Clayton Air Compressor Works, Brooklyn, N. Y., offices Havemeyer Building, 26 Cortlandt s reet, New York, report that their volume of sales for the month of October is larger than any preceding month in the history of the business and three times greater than their average sales for five years past. These works are now constructing one 25-horse power compressor for 3,500 pounds pressure, and one 50-horse power compressor for 2,500 pounds pressure, for the Western Manufacturing & Oil Company, Newark, N. J. They also have orders in hand for a Compound Air Compressor, ordered by Fraser & Chalmers, of Chicago, a Duplex Air Compressor for the Deane Steam Pump Company, Holyoke, Mass.; three Duplex Air Compressors for compressed air shop plants; two Air Compressors for the Consolidated Pneumatic Tool Company; one Air Compressor for sand blast work; one for operating pneumatic railway signals; two Compressors for air lift pumping plants; two Com-

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THOMAS CARLIN'S SONS.

Allegheny, Pa.

Hoisting Engines, Derricks of Steel or Wood, Contractor's Tools and Machinery.

Hawley's Patent Sand Feed

[illegible]

D. J. & C. H. HAWLEY,
Manchester, Vt.

HOW ABOUT ROCK DRILLS?

[illegible]

WILLIS SHAW,
[illegible]

SPIRAL



Sand Pump

[illegible]

SAWING STONE.

[illegible]

PRENTISS & LeBLANC, Rutland, Vt.

WILLIAMSPORT WIRE ROPE CO.

Iron, Steel and Galvanized

WIRE ROPE

HOISTING AND HAULAGE ROPES A SPECIALTY

WILLIAMSPORT, PA

[illegible]

SECOND-HAND PLANERS

Especially Adapted for Stone.



[illegible]

Prentiss Tool and Supply Co.

115 Liberty St., NEW YORK.

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pressors to the Shone Company, of Chicago, for their pneumatic sewerage system, and one large Duplex Compressor for the Consolidated Gas Company, New York. This unprecedented rush of business is a satisfactory demonstration that improved times are here and a most decided recognition of the merits of the Clayton air compressing machinery.

Willis Shaw, contractors' machinery, Chicago, Ill., reports the following recent sales: 75-h. p. double drum mining hoist to J. D. Hardin, Deadwood, S. D.; quarry machinery to the Mitchell Lime Company, of Mitchell, Ind.; 80-h. p. air compressor to the "Soo" line, Minneapolis; hoisting machinery to the "Big Four" railroad at Ludlow Falls, O.; steam tug to James Stewart & Co., St. Louis; two locomotives and an equipment of "Shaw" dump cars to Vandegrift & Jacobs, for use on the Duluth & Iron Range railroad; 75-h. p. mining hoist for the Great Eastern Gold Mining Co., of Deadwood; 50-ton steam shovel to the Marion Brick Works, at Marion, Ind.; and a carload of hoisting engines to Major Harrod, of the New Orleans Drainage Commission.

BOOKS AND PERIODICALS.

Mr. Garrett P. Serviss, the widely known and popular astronomer, will have a most instructive and interesting article in *Appleton's Popular Science Monthly* for December, in which he discusses the probability of there being planets similar to our own earth, containing inhabitants, among the so-called fixed stars. The apparatus and methods used in the production of animated photographs, in the cinematograph, biograph, etc., will also be fully described and pictured by J. Miller Barr.

The Christmas number of *Frank Leslie's Popular Monthly* is brimful of attractive articles and entertaining stories for the festal season. The number opens with a Christmas story by Frank R. Stockton, entitled "Old Applejoy's Ghost," which contains a particularly clever idea worked out in Mr. Stockton's well known, pleasing manner. It is illustrated with three full-page drawings by George Wright. This is followed by the second paper in the magazine's important series on Andrew Jackson, and his times and compatriots, taking up this month "Andrew Jackson as a Military Commander, written by A. Oakey Hall, and containing portraits and views, and an excellent picture of Jackson spending Christmas Day, in 1814, by H. M. Eaton. Hunter MacCulloch contributes an entertaining paper on "The Music of Christmas Time," which is made particularly interesting by the insertion in the text of reproductions of the music of some of the old-time songs and carols. "Famous Ranchos of the San Gabriel Valley," written by Beatrice Bellido de Luna, has many fine illustrations. Perhaps the most important article in the number is one on "The Baptists," in which General T. J. Morgan, Corresponding Secretary of the American Baptist Home Mission Societw, describes the history, growth and creed of that religious body in this country. It is the first of a series of articles on the Religious Denominations of America. There are other interesting articles; several short stories in addition to the one by Frank R. Stockton, contributed by Amelia E. Barr and Margaret E. Sangster; poems by Ella Wheeler Wilcox and Minna Irving; an attractive department for the boys and girls, etc., etc.—Frank Leslie's Publishing House, New York.

DREAMS IN HOMESPUN, by Sam Walter Foss, author of "Whiffs from Wild Meadows," "Back Country Poems." Lee & Shepard, Boston. Price, $1.50.

Mr. Foss belongs to the school of Carleton, Field, and Riley—genuine humorists who have something to say and a popular way of saying it. While there is plenty of humor in his work, its strength lies in its philosophic suggestions and earnestness of thought. In this respect his poetry is unique. His verse, however, is not lacking in variety. As one critic said, in reviewing "Whiffs from Wild Meadows": "Here you have something that touches you all around—touches your weak points and your strong points—from gay to grave, from lively to severe, and after having been shaken up and tossed about from every angle of vision, by tender humor, and caustic satire, and brimming joviality, and prickly truths, and sparkling witticisms, and palpable hits at the guilty violator of law and the amenities of life, you rise up a better, a truer, and a nobler man."

"The same characteristics that distinguished his previous volumes are generally observable throughout this one. The author's talent consists largely in treating common, everyday themes poetically. He invests with a halo of homespun beauty the scenes and incidents in

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VICTORY FOR THE BOYER HAMMER.

To the Trade.

We are pleased to state that on January 7th the United States Circuit Court ... at New Haven in the infringement suit brought by The American Pneu... against the Bigelow Company of New Haven Conn. for using ... Hammer, decided in favor of the defendant and reversed the decision of ... court. In rendering the decision we have always taken and the assur... we have given the trade that the Boyer Hammer did not infringe the ... American Company and furnishing a complete answer to the threats ... which that company have been making with respect to the ... Hammers.

... regular Boyer Hammers which are familiar to the trade and ... a high reputation, we are now prepared to furnish a ... Boyer



... hammer with which we have designated The New Boyer. The valve ... this new hammer is entirely different to the old and is regarded ... as a marked strength over that which has been known as the ... We are ... material improvement ... We ... Hammer to the trade ... We are ... the new hammer ... We ... Address all communications to the ...

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the lives of average men. The humorous element is seldom long lacking from Mr. Foss's verse, and there is usually a trace of philosophic suggestiveness behind the humor. He is strongest, perhaps, in depicting the shrewd and quaint, but wholesome and healthful humor of the New England farmer. The author's early life upon a farm comes back to him with its hard and unlovely features softened, perhaps, and with its idyllic beauties glorified by the illusions of distance and memory."

What would you do if war should be declared tomorrow with a European power? How would it change your home life, the lives of your brother and other relatives? How would it affect your business connections and business? What changes would it make in financial, city, state and national affairs? It is these interesting problems which a writer in the December *Cosmopolitan* has undertaken to sketch under the heading of "A Brief History of Our Late War with Spain," at the same time vividly describing the exciting scenes which would attend the opening of hostilities. This same number of the *Cosmopolitan* has an article on "The Well-Dressed Woman," by Elsie de Wolfe, a contrast of the characters of Henry George and Charles A. Dana, by John Brisben Walker, in another place "The Loves of Goethe," while Wells' story, "The War of the Worlds," which has been so widely read, reaches its conclusion in an unexpected way.

THE DISTRICT SCHOOL AS IT WAS, by Warren E. Burton. New Edition, edited by Clifton Johnson, author of "The New England Country," "Country Clouds and Sunshine," "What They Say in New England," etc, With illustrations. Lee & Shepard, Boston. Price, Cloth, $1.25.

This bright and vivid description of one of the early institutions of New England was first published in 1833, and met with a very favorable reception, the first edition being followed by several others, both in this country and in England. It has been out of print for some years, but of late, there having arisen quite a demand for it, or a work of a similar character, Mr. Johnson has edited the work, introducing illustrations showing the character of the textbooks from which our forefathers gathered their early education. As time slips away, and all vestiges of the early customs are removed, these reminiscences of bygone times have an increasing interest and value. The descriptions are unusually simple and clear, and at the same time contain a humor that makes them good reading, aside from any historic attraction. The hope of the author as expressed in the preface to the original edition is certainly realized, "that it will ever be of historical use to rising generations, educated under better auspices as exhibiting a true and graphic picture of the District School as it was."

The chapter entitled "A Supplication to the People of the United States," is so odd and the list of mispronounced words is so characteristic of the country folk of fifty or seventy-five years ago that it is well worth preserving.

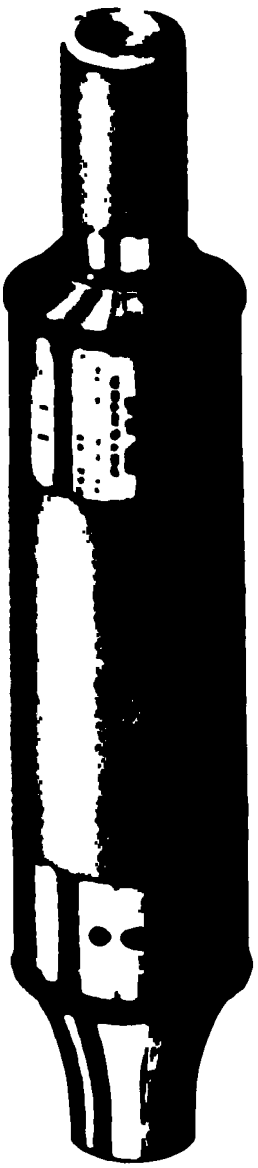
To those of the elder generation this work will be a pleasing reminiscence of their own youthful days.

The complete novel in the December issue of *Lippincott's* is "Poor Chola'" by Julia P. Dabney. The scene is an unfamiliar one—Tineriffe, in the Canary Islands; the story is full of local color, interest, and pathos; the plot is far from commonplace. Other features are: "Gold Mining in North America," George Ethelbert Walsh; "Who are the Greeks," W. A. Curtis; "Opportunity" (Quatrain), Madison Cawein; "Dr. Felix," Francis Lynde; "Dead Souls" (Poem), Calvin Dill Wilson; "Egyptian Queens," Leigh North; "The Club Movement among Women," Emily Tolman; "The Red Light," Joseph A. Altsheler; "A Forgotten Grace," Annie Steger Winston; "Two Thanksgivings" (Quatrain), Emma C. Dowd; "Uncle Sam's Four-Footed Friends," Charles Dudley Rhodes; "The Consolation of Gamaliel," Marion Manville Pope; "Fleur-de-Lis" (Poem), Martha T. Tyler; "Beards and Barbers," Francis J. Ziegler; "Some Literary Shrines of Manhattan—II," Theodore F. Wolfe.

With the November issue, the title of *The Colliery Engineer and Metal Miner*, Scranton, Pa., was changed to "*Mines and Minerals.*" There is no change in the ownership nor in the editorial management. The form and size of the publication remains the same. The new name has been adopted because it expresses the scope of the publication better than the old one.

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NOTES FROM QUARRY AND SHOP.

Allegheny, Pa.—Ground will be broken within a few days for a brewry on the North Side. The First National Brewing Co., which was chartered three weeks ago with a capital of $300,000 will erect their plant on Preble avenue, Woods Run. The proposed new buildings will cost about $25,000, and when equipped with the necessary machinery and appliances the new plant will cost at least $225,000. The buildings will be built of brick and stone and will not be less than seven stories in height. A large ice plant which will be run in connection with the brewry, with a capacity of 60 tons daily, will be in full operation by next May. The officers of the new concern are: V. Wiss Tolman, President, Fred Waldschmidt, Secretary, and P. V. Vovnianek, Treasurer.

Watertown, Wis.—J. J. Archie & Son are building an addition to their marble shop in order to accommodate their constantly increasing business.

Bluffton, Ind.—N. T. Miller and George Studabaker have purchased the stone crusher at the Freeman quarry together with the entire plant at the Kemp quarry. The new firm of Miller & Studabaker will engage actively in the stone and gravel business. They propose by way of experiment to build a macadamized street 480 feet long at some place in the city where the council may direct; this street will be built on scientific principles with curbing and ample draining. They propose to make it so good that they will get the job of making several such streets in Bluffton.

New Castle, Pa.—A company composed of W. S. Moore, Charles Westlake, R. F. Dana and Oliver Moore, of this city, and H. B. Wick, of Youngstown, has been formed to operate stone quarries near Eastbrook. The stone is very rich in silica, and a mammoth plant to crush it for commercial purposes will be erected.

Adams, Mass.—A new quarry has been opened on Charles O. White's farm in Washington, Mass., adjoining the Winslow and Crane farms. The stone is of beautiful, gray mica. Specimens may be seen at the Winslow mansion, where steps hewn from the quarry have been placed, also at Mr. White's house and Walter R. White's at Westfield.

Some years ago Mr. J. McKinnie offered for sale eighty acres of land one-half mile west of Trenton, Mich. As the property was said to contain valuable limestone, a competition arose over the purchase of the property between J. B. Ford and Church & Co., which resulted in the sale of the land to Mr. Ford. An examination did not reveal the stone in sufficient quantities to pay for quarrying, and the land has since lain idle, Mr. Ford purchasing the stone for the use of his soda-ash plants from Sibley's quarry. Last week another examination was made, and a shaft fourteen feet square was sunk down to rock. Mr. Ford now thinks he will be able to quarry stone for his own use from this land, and will convey the necessary machinery to the grounds and begin work there soon. Church & Co., Trenton, Mich., also contemplate doing their own quarrying; and are now looking over sixty-five acres of quarry land two miles below Trenton, now owned by Joseph Anderson. Mr. Anderson says good stone comes to within five feet of the surface on their ground.

The silica sandstone quarries near Eastbrook station are to be operated by a company composed of W. S. Moore, R. F. Dana, Oliver Moore, Charles Westlake, of New Castle, Pa., and H. B. Wick, a prominent Youngstown, O., iron manufacturer. The necessary machinery and tools have been ordered and a charter will soon be applied for.

The Anderdon stone quarry, owned by T. B. White, of Anderdon, and Sol White, ex-M. P. P., of Windsor, Ont., has been purchased by Henry J. Hall, of 1492 Twenty-fourth street, Detroit, Mich., for New York and Philadelphia capitalists. The amount paid for the quarry

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was $60,000. Recent tests showed that lime and salt are present in large quantities, and it is the intention of the syndicate to operate a soda ash plant.

W. O. Lasher, of Bearsville, N. Y., has struck it rich in the quarry line on the old Snake Rock, and it is proposed to call it the Klondike. A twenty-foot bed of the finest dimension stone now lies before them, that will afford work for months to come. The stone is as straight as a die, and for all ordinary work can be used without planing, and for fine work it is worked with the greatest ease and economy. Good judges predict that the prospects there are good for the profitable employment of a full gang of quarrymen for the next ten years. Ulster county bluestone against the world.

George T. Stewart, of Aspen, Col., has discovered a valuable marble quarry near Aspen. Samples of the stone submitted to expert marble men have been pronounced of a very superior character. Mr. Stewart says that the ledge can be easily traced up and down the stream for half a mile, and he has located 160 acres on the ledge. Onyx of a desirable quality can also be quarried. T. G. Lyster, a well-known banker of Aspen, is interested in the enterprise and is in Denver negotiating with the object of opening the quarry on a large scale. It is probable that a syndicate of Aspen and Denver men will take hold of the work. Already orders to the amount of $10,000 have been filed for the marble by monument dealers, and the first effort will be to supply this demand.

Bergen, N. Y.—All Bergen is happy over the outcome of some negotiations which have just been brought to a succsssful issue here. The marlbeds, a mile west of this village, are now under the control of a company composed of men who will push the manufacture of this valuable material into Portland cement. They have options on about 500 acres of land, on which is found both marl and blue clay. The blue clay is also used in the manufacture of cement, and therefore the combination is a valuable one. The quality of the marl is excellent, and all that was needed was that a company of men capable of establishing a factory of proper size should be found to make Bergen enjoy a little boom. Such men as Jacob Davis, of Buffalo; William E. Webster, of Batavia, and H. D. Cofflin, of the Oakfield Fertilizer Works, who have taken hold of this enterprise, insure that it will be eminently successful. One million dollars will be invested in the erection of the factory and capitalizing the plant, which will turn out about one thousand barrels a day of Portland cement.

Application for a receiver for C. D. Jackson & Co., dealers in marble and onyx, at No. 1 Madison avenue, New York City, was made to-day in the Supreme Court, in a suit brought by Carl D. Jackson against John B. Cole, his partner, for a dissolution.

Chicago, Ill.—The yearly statement of the Western Stone Company will show that the total obligations of the company have been reduced to less than $600,000. It is not improbable that a dividend will be paid early next year.

New Haven, Conn.—Edward O'Brien, a stone quarryman, with works on East street, filed a voluntary assignment in the probate court, naming Alonzo Van Nostrand trustee. The liabilities are several thousand dollars, but as no schedule was filed, the exact amount is not known.

New Haven, Conn.—In the suit of Daniel Julian vs. the Stony Creek Red Granite Company, the defendant's demurrer on the complaint was overruled. Ten thousand dollars' damages was asked for injuries received from a falling derrick on July 25, 1895, at the quarry.

A deficiency judgment for $23,283 was entered Dec. 5 against Thomas J. Brennan, dealer in stone at the foot of West Fifty-seventh street, New York City, in favor of Anna Estelle Troescher, growing out of the foreclosure sale of several apartment houses at the southeast corner of the boulevard and One Hundred and Fifth street. Another judgment was also entered against him for $12,453 in favor of the New England Brownstone Company, of Connecticut, on six of his notes.

The firm of Simcoe & Foster, Fulton, Mo., has been dissolved. Geo. W. Foster will continue.

Little Falls, N. Y.—Beckwith & Quackenbush, the Herkimer contractors who have the contract to improve the canal between this city and the Jacksonburg lock, have made all preparations to commence the work December 10. The contract to quarry the stone has been let

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to Jacob Brown, and he has commenced to get them out. There will be considerable blasting done in the bottom of the canal in this section as the bottom is solid stone. Messrs. Beckwith & Quackenbush are also projectors of the electric railroad, and announce that they will carry the work on in conjuuction with the canal contract.

A. F. Nelson, who has a contract for getting out 15,000 cubic yards of stone for the new water reservoir, has twenty-five men at work on the property of the Highland Improvement Company at Duluth Heights. It is said that this stone is proving the best that has been found here and owing to its advantageous location with relation to the site of the reservoir the much shorter haul of four miles is made possible. Twenty-five men will be given work pretty well all winter.

The Bridgeford and Stone Company, of Louisville, Ky., has filed articles of incorporation with the Secretary of State. The capital stock is $75,000. The principal incorporator is C. W. Adams.

Cobleskill Quarry Company, of New York, N. Y.; capital, $30,000; directors, Edward Shanly, Patrick Ryan, Collis McLean, Darwin E. Wright and Michael J. Degnen, of New York.

Albany, N. Y.—Papers incorporating the Point Abino Sand Company, of Buffalo, have been filed with the Secretary of State. The new concern is capitalized at $50,000 divided into 500 shares and is to begin business with $10,000. It objects are stated to be to deal in sand, gravel, stone and building materials. The directors for the first year are Allen I. Holloway, Raymond A. Burton, of Buffalo, Harry J. Shoemaker, Doylestown, Pa.

Bay State Seam Face Granite Company has been organized at Portland, Me., for the purpose of developing and dealing in real estate with $500,000 capital stock of which $250 is paid in. The officers are: President, John J. Barry, of Quincy, Mass.; treasurer, Joshua T. Butler, of Somerville, Mass.

One of the finest pieces of stone masonry work to be found in this section, says the Mt. Pleasant (Mich.) *Democrat*, is to be seen in the new power house at the Indian farm, just completed by J. S. Kerns & Son, contractors, of Saginaw. The foundation of the building is simply artistic and shows the master workman in every beaded joint, which gives it such substantial appearance. In fact, the whole building, from foundation to top of smoke stack, is a model, the brick work being on a par with the rest. They are now at work on the girl's dormitory and have the basement nearly completed. The other contractors have the school building nearly finished, and the mess hall, which stands in the rear of the first main building, is completed except the interior finish. The smaller wooden buildings, workshops, etc, have all been moved into a line with the new mess hall and power house, and the line gives the place very much the appearance of a small village.

Incorporated: The Kansas City Marble and Lime Works, Kansas City, Mo., capitalized for $100,000. The company has leased valuable marble quarries near Stillwell, about 270 miles from Kansas City. The marble taken from the quarries, according to exhaustive analysis, is of an excellent quality for building and tombstone purposes, being susceptible of a beautiful polish. Some of the marble is of a delicate pink, while other samples are of a tasty drab which makes very appropriate tombstones. Much of it is of a grayish white, and all of it is believed to be of as good quality as any of the marble brought from great distances, and even foreign countries. But the principal utility of the marble, at least the purposes to which the product will be chiefly put at first, is for marble dust for carbonating works. Ten thousand barrels of this product are used in Kansas City every year, and in St. Louis it is sold by the train load. The incorporators are: C. D. Whiting, 4,000 shares of common stock and 2,000 shares of preferred stock; F. A. Green, 2,000 shares; Lloyd Allen, 300 shares; A. R. Bell, 700 shares; W. P. Borland, 250 shares; J. J. Green, 250 shares.

Chicago, Ill.—The labor organizations whose members are engaged in the marble industry have decided upon a plan by which it is expected the workmen in every marble shop in the city will work only eight hours a day instead of ten. This will be brought about, it is said, by the adoption of a union label, which will be given out to employes who agree to the eight-hour day. Then the Building Trades Council will refuse to permit its members to handle marble which does not bear the union

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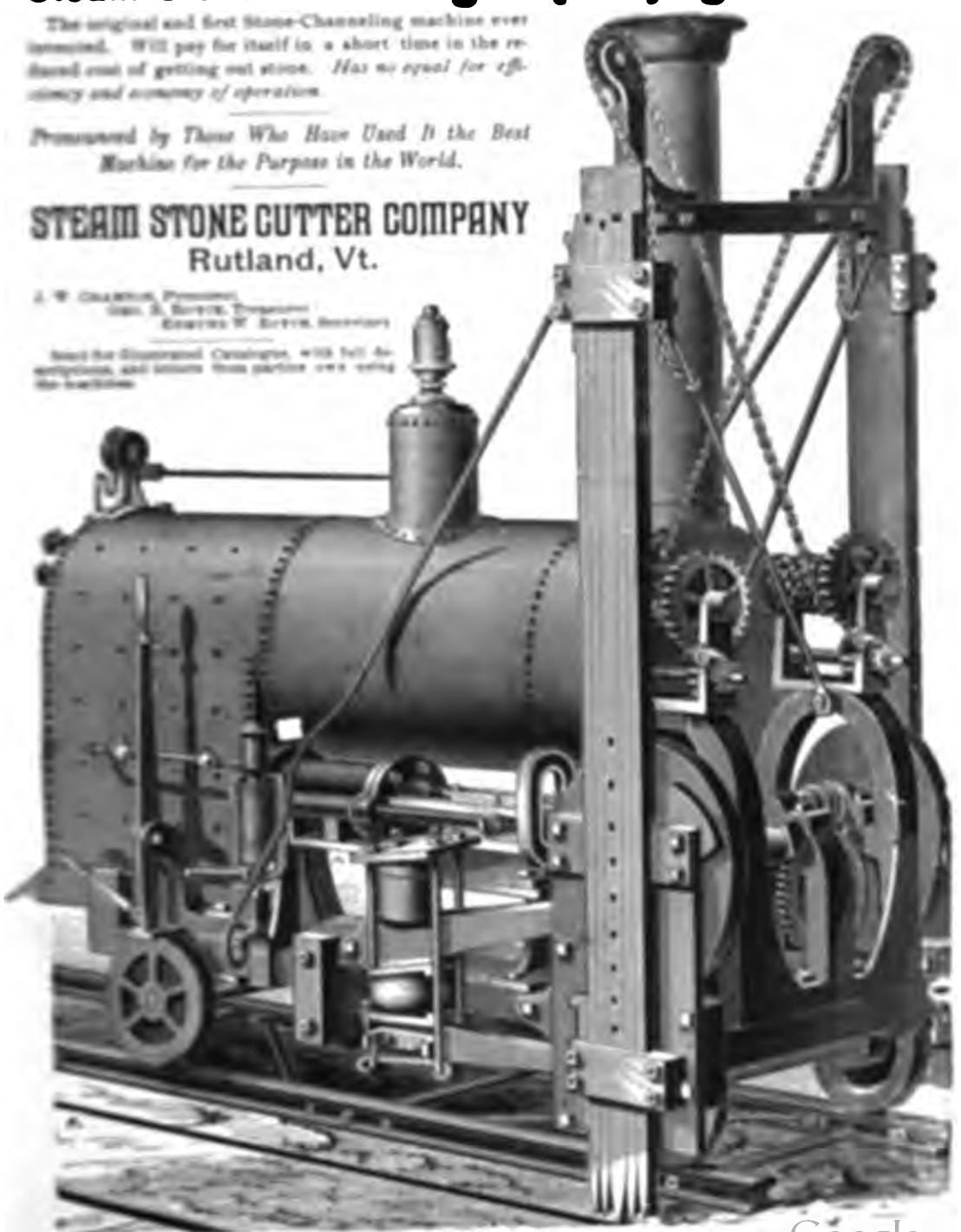
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label. The employes in the marble shops are known as polishers, bed rubbers, sawyers, laborers, apprentices and engineers. Each workman will be expected to join the organization of his craft. Business Agents Davis of the Hoisting Engineers' Union, Huber of the Bed Rubbers and Sawyers, and Quinn of the Marble Cutters, are at work on a design for a label, and when their plans are matured they will ask the assistance of the Building Trades Council in their work of reducing the hours of labor in all marble shops. The marble contractors will be given a satisfactory period in which to make the desired change. Then all who refuse will suffer from a boycott by the Building Trades Council, as none of their products will be handled by union men on any building in the city.

Moulton, Ia., had quite a blaze the morning of Nov. 30. The building occupied by Charles Anderson's marble works was burned to the ground. A defective flue caused the blaze. Everything was gotten out of the building. There was no insurance.

Springfield, O.—About fifty of the lime manufacturers of Ohio, Indiana and Michigan are expected here Dec. 2, to form an organization for the purpose of fixing a schedule of prices for the tri-state league, and to further the interests of the manufacturers in other directions.

Alexander Matheson, a marble and stone dealer at Grand Rapids, Mich., died Nov. 28, aged 64. He was a well known Mason. He leaves a widow and seven children.

The granite business at the present time in Stonington, Me., is in better condition that it has been during the past summer. Goss & Small are employing about 125 men and are working on the Willis avenue bridge for New York, and the Longwood bridge of Boston. Their contracts show work good for eighteen months hence at least. John L. Goss has about seventy-five men on the pay roll.

Milford, Mass.—The Milford Pink Granite Company has shut down and discharged a force of 150 men because of no orders ahead. The firm has cleaned up all the contracts on hand, and it is not likely that business will be resumed to any appreciable extent before spring.

Chamberlain, S. D.—Over a year ago work was commenced on a new artesian well at Kimball, to take the place of an old well, the flow of which had ceased. The new well has reached a depth of 1,246 feet, cased partially with 6-inch and partially of 4-inch pipe. Work upon it has just been suspended, probably indefinitely. Contractor Eyre thinks the drill has struck the strata of Sioux Falls granite. He offers to throw off the sum of $500 on the contract price and leave the well in condition for pumping. Pending an opinion of the state geologist as to the nature of the obstruction, the offer was not accepted. The water stands in the pipe within twenty feet of the surface of the ground, just the height of the water in the old well, fifty feet distant. The artesian well which has supplied the town of Armour with its water supply has also decreased greatly in flow, caused probably by the rusting off of the casing at some point below the surface, permitting the flow to escape.

Kansas City, Mo.—Cassius M. Ensminger. He had been in the marble business here for several years past.

In view of the approaching golden jubilee of the discovery of gold in California, it is worth while to recall the fact that in 1887 the legislature of that state appropriated the sum of $5,000 for a monument to James W. Marshall, the discoverer. That memorial stands now over his grave in Coloma, Eldorado county. "El Dorado" is now applied to the great Pacific coast commonwealth, but the Spanish term really means "the gilded man." Orellana, a companion of Pizzaro and the pioneer explorer of the Amazon, had heard of a king whose garments, changed daily, were of woven gold. From this fabulous South American king came the idea of a region of El Dorado, for which even Raleigh, that "Shepherd of the Ocean," made quest.

Terre Haute, Ind.—Alexander Owens, a marble dealer, became enraged at Alexander Lawrence, an employe at the cemetery, and struck him a fatal blow as they stood on opposite sides of a grave. Owens was placing a monument at the grave when Lawrence suggested that the base was not in a good position. Owens resented what he termed the interference of Lawrence and seizing a heavy oaken roller struck Lawrence on the head before the other workmen could prevent him. Lawrence's skull was crushed and he died several hours afterward.

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Mexico, N. Y.—The announcement of the village board of trustees that they would allow 25 cents per 3,000 pounds for stone drawn to the rear of Thomas' mill for crushing was answered in less than a week by the delivery of over 1,020 tons from the farmers in the immediate vicinity.

Webster City, Iowa.—In placing the monument over the grave of Kendall Young, who bequeathed $200,000 to Webster City for a library, it was necessary for workmen to change the location of the grave. It was thought Mr. Young had been buried in as fine a metallic coffin as could be purchased in Battle Creek, Mich. When the grave was opened the top and one end of the casket was decayed and the discovery was made that the coffin was composed almost entirely of wood and finished in such a manner as to represent the expensive coffin paid for by the heirs.

Colton, Cal., is booming. Its marble quarries and lime kilns are running full blast and turning out many carloads ot valuable products.

The most famous and best known of all writers, "Anonymous," is to have a monument set up in Hungary at the expense of the emperor, Francis Joseph. This particular "Anonymous" is the unknown notary of King Bela, who wrote the "Chronicle of Hungary."

It has taken seven years to build the colossal mausoleum of Czar Alexander II. in the Kremlin at Moscow. The statue, by Opekouchine, is sixteen feet high. It stands on a pedestal of Finland granite twenty-three feet high and is surmounted by a granite cupola, the gilt bronze roof of which rises to a height of one hundred feet. The mausoleum has cost 1,500,000 rubies.

Rockland, Me., parties have been working the old lime quarry on the west side of Long Island for six months or more and are extending their operations. They have built a large shed, set up a steam drill, etc., and have made some shipments. The prospect is favorable for an increased output from this quarry.

The stone-cutters working on the new building of T. C. Jenkins, are in trouble with the Building Trades Council. The cutters belong to a local union that has no affiliation with the National Stone-cutters' union, controlled by the Knights of Labor. At a recent meeting of the Building Trades Council it was suggested that the local union should affiliate, or be declared non-union. They having failed in the former, a delegate waited on Mr. Jenkins to inform him of the action of the Building Trades Council, and request that he instruct the contractor to employ union stone-cutters, recognized by the other trades as such —*Pittsburg (Pa.) News.*

Petersburg, Va.—The test to which Prof. Lee subjected a block of granite from a neighboring quarry a few nights ago is a high testimonial to the quality of the granite near this city. It successfully resisted repeated blows from a sledge hammer in the hands of a stone mason. Under this test ordinarily a block is shivered after two or three blows, but this block only showed the indentations of the hammer. The toughness of texture and firmness of fiber make the Petersburg granite the most durable in the world, but these qualities are a serious handicap to our quarrymen in competing with the softer and more easily worked granite of North Carolina and other places. Communities and individuals, however, who put quality above cheapness are likely to give the Petersburg granite preference even at a little higher price. —*Appeal.*

The building stone of southwest Missouri is an element of natural wealth which has until recent years been reckoned among the important resources of the country. The quantity of this material is practically inexhaustible and its quality equal to that of the best quarries of the Union. Such a public edifice as the Jasper county court house shows the splendid possibilities of this native limestone when used for building purposes.

A bridge is to be built across the lower Danube, between Turn Severin on the Roumanian side and Kladowa on the Servian bank, at a cost of $4,000,000.

Pen Argyl, Pa.—The Bangor and Pen Argyl slate region has been visited by English capitalists, who have formed a company to develop the American slate trade in Great Britain and on the Continent of Europe by the importing of slate from the United States. The company will be known as the American Slate Mart and Wharf Company, Limited, of London, England, and will have a capital of $500,000. Samuel Keat, of Pen Argyle, is a stockholder and the sole representative of the company in this country.

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The export of stone from this peninsula will reach 20,000 cords at least. It is estimated that to quarry, handle and load a cord of this material will average $1.50, which brings the total paid out on this account something like $30,000. The limestone quarries of Door county are almost as good as a gold mine. And what is more to the point they are quite inexhaustible. —*Sturgeon Bay (Wis.) Advocate.*

A case of considerable importance has recently been decided in Waldo county, Maine. Two non-union men were discharged from their work in the Mt. Waldo granite quarries because the union men threatened to quit unless the non-union men were discharged. They sued the company and the jury awarded them damages. This imposes on employers who discharge help under intimidation the duty of paying the help so discharged enough perhaps to tide over the average time that might be required in finding a job. Thus, employers suffer from the action of their employes when those employes are in two hostile camps. Now, the mulcted firms may turn and sue the labor unions to recover the sums assessed in damages. It will be an interesting case if pushed to its possibilities.

New York, N. Y.—Despite the general outcry against any further destruction of the Palisades, Carpenter Bros., the quarrymen, who have already blown to bits the historic landmark known as Washington's head, just north of Fort Lee, are now busily engaged in preparing a still larger blast. It is to consist of from 7,000 to 9,000 pounds of dynamite, and will be the biggest blast ever set off in this neighborhood. It will take about two months to get the tunnel ready for the blast. This tunnel will run north and south through the base of what was Washington's head.

The Western Stone Company, of Chicago, is seriously considering the addition of a new and important branch to its business. The company has never furnished crushed stone, such as is used for the foundation of brick and asphalt pavement and in macadamizing, but may shortly enter this field, which is a wide and rapidly increasing one. Until recently asphalt pavement for heavy traffic thoroughfares has been regarded as an experiment. But the Western Stone people believe that the experimental stage is past, and that within the next few years many miles of asphalt pavement will be laid in Chicago's streets. But even in the event the asphalt pavement is not generally indorsed, the Western Stone officials believe that the day of the cobblestone pavement in Chicago is gone by; that eventually it will be supplanted almost entirely by brick or asphalt pavement. As the former requires a crushed stone foundation, as well as the latter, and as there is good prospect that a great deal of new paving will be done in Chicago within a short time, the crushed stone venture is quite alluring. At its quarries the Western Stone Company has ample room for the necessary crushing machinery, and its cheap transportation facilities—by its own boats on the canal—the officials say, will enable it to place crushed stone in the Chicago market on a cheaper basis than any firm with which it might have to compete.

Tate, Ga.—The Butler-Ryan Company, of St. Paul, Minn., has contracted for the development of the Herndon marble quarries, near Tate in Pickens county.

St. Paul, Minn.—John Nevins & Sons, contractors of this city, have secured a contract with the Great Northern road for the quarrying of a large amount of granite and mason work to be done this winter in Montana. Their machinery and equipment will be shipped from this city. Mr. Nevins states that the men to be employed on the work will also be taken from this city. The work will provide employment during the whole winter.

New York City.—A salesroom for building stone and material is to be opened at 2 East One Hundred and Twenty-fifth street by Chas. E. West.

Toronto, O.—The county commissioners have been informally discussing the advisability of opening a stone quarry at the infirmary, and erecting a building near there where tramps, train-jumpers, and county prisoners could be put to work breaking stone for the pikes. It is also said that many men who spend each winter in the infirmary would be able to put in their time at such work, and in this way pay for their keeping.

Windsor, Ont.—It is reported that the stone quarry in Anderdon township has been sold to a syndicate of Chicago and Pittsburg capitalists. This syndicate intends to establish a soda ash plant in Windsor and the limestone is a necessity.

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Council Bluffs, Iowa.—J. F. Bloom, of the firm of Bloom & Lewis, will open a marble business soon in this city.

Mercer, Pa.—The Carnegie company has leased the Buchanan, Wiley and Covert farms near Wick station, and have from fifty to one hundred men at work opening a limestone quarry and building a switch. The limestone will be shipped to the iron mills, which consume several hundred tons daily.

Livingston, Ky.—In his stone quarry on Town branch, this county, Dr. Lovell feels certain that he has found the very finest quality of lithographing stone. He has found a stone that gives the best surface of any stone yet quarried in this country, he says. He will have it tested.

Janesville, Wis.—Henry Dryer, of Montford, will engage in the marble business here. He expects to erect a building near the cemetery for his use.

St. Cloud, Minn.—William C. Baxter, the Minneapolis granite producer who is to furnish the granite for the new capitol, closed a deal for the purchase of a tract of land comprising nearly twenty acres and inside the city limits. It is entirely surrounded by the railroad lines of the Great Northern and Northern Pacific, and Baxter will at once erect stone-cutting sheds on his new purchase. He expects to engage heavily in the monumental business as well as structural granite. The consideration of the sale is not stated.

Lemont, Ill.—The statement is given out that the quarry just below town is soon to be opened by Mr. Corneau, formerly of the well known quarry firm of Boyer & Corneau.

Indianapolis, Ind.—The Virginia Onyx Company, of Indianapolis. Capital, $500,000. The company owns two hundred acres of land near the National Bridge in Virginia and which covers extensive onyx mines. It is estimated that 10,000 carloads can be taken from the property for use in fine buildings for interior decorations. The directors are D. M. Geeting, Frank A. McBride, F. F. Churchman, Charles F. Coffin and E. B. Hussey. Headquarters are in Indianapolis.

Sedalia, Mo.—The Missouri Marble and Lime Company has been organized. The new company is a reorganization of the old marble company and will be incorporated with a capital stock of $50,000. The leases held by the stockholders in the old Great Western Marble Company are known to cover some of the finest marble territory in the country. The officers are as follows: President, Peter Rockwell; vice president, Cord Lujin; secretary, Charles Rockwell; treasurer, F. L. Wright, of Smithton. The directors of the concern are W. B. Lyons, A. A. Allen, Peter Rockwell, F. L. Wright, James Ringen, S. F. Shackles, Cord Lujin, C. C. Clay and W. T. Dewees.

"O. K." is the name of a newly chartered slate company; capital, $15,000, at Bangor, Pa., says the *Bangor Observer*.

Red Oak, Iowa.—Bloom & Lewis, marble, moved to Council Bluffs.

J. W. Brawn and son, of East Guilford, Me., have sold one of their granite quarries to Hiram Brawn. About 150 yards will be taken out this fall.

Ripon, Wis.—Krueger & Vilwock, marble, reported to have been succeeded by T. H. Krueger.

Fredonia, Kan.—Prange & Deshazo, marble, reported to have dissolved.

Port Jervis, N. Y.—H. S. Whitmore has again taken up the stone business. He has opened a new quarry.

The Sheriff received an execution against the Schneider-Birkenstock Marble Company, of No. 338 East 107th Street, for $16,858, in favor of Charles Schneider, for merchandise and money advanced to the company from September 1, 1894, to September 27, 1897. The compaey was incorporated under New York State laws on July 19, 1894, with a capital stock of $50,000, Charles Schneiper, Jr., becoming president and John W. Birkenstock treasurer. The sheriff put a keeper in charge of the place.

Louisville, Ky.—The case of W. H. Carlisle against Val Franck, in which the plaintiff asked $10,000 damages for an alleged breach of contract, growing out of the leasing of the defendant's stone quarry, was dismissed upon peremptory instructions.

Anderson, Ind.—Fire wiped out the forging department buildings of the Buckeye Manufacturing Company. The loss is estimated between $20,000 and $25,000. A new plant wil be built at once.

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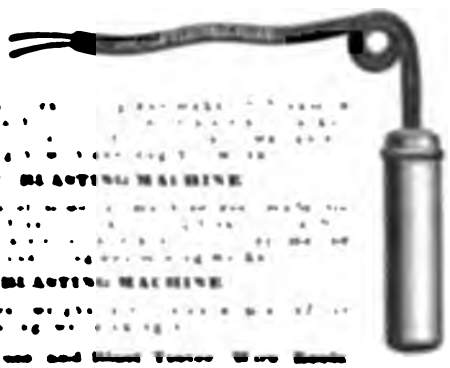
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The Sullivan Granite Co., whose quarries are in West Sullivan, Me., has assigned to Dunbar Bros., of Sullivan. The liabilities of the Company are $25,000, while the assets are very small, being, so it is said, only about $300. Drunba Bros., are the largest creditors. The company was organized in 1891 and is composed of C. O. Emery, E. B. Colcord and W. W. Case, all of Rockland. Mr. Colcord has been manager of the works. The reason assigned for the cause of the failure is an inability to make collections.

George M. Stark, a well-known quarryman and farmer of Harrisburgh, Ohio., filed a deed of assignment to C. H. Copeland, a merchant of that village. The property assigned consists of 95 acres adjoining, in Pickaway county, as well as personal property. The assets are estimated at $10,000 and liabilities at $7000.

Wabash, Ind.—Jacob Hildebrand, president of the Treat Creek Stone Company, died of neuralgia of the stomach.

Kankakee, Ill.—Camden Knight, of Kankakee, died at Custer Park Nov. 17, of pneumonia. He became interested with relatives in the development of stone quarries, and remained until 1881, since which time he has resided at Custer Park on the Kankakee river.

John Thomlinson, Sr., of the former stone firm, Fuerst, Neu & Co., Chicago, died on 9th inst.

Memphis, Tenn.—F. H. Venn & Co., marble, etc., F. H. Venn deceased.

Utica, N. Y.—Hughes & Evans, marble, granite, etc., L. R. Evans deceased.

Climax, Mich.—F. Hodgman has recently caused an examination to be made of the marl beds near this village. It is found that in one of these beds there is in the neighborhood of 100 acres of marl which has been tested in various places to the depth of 20 feet without finding bottom. An eastern firm is considering the question of locating a factory here which will turn out 1,000 barrels of Portland cement daily, and is in communication with Mr. Hodgman in regard to it.

Greensburg, Ind.—Surveys are being made of the properties of the Greensburg Limeatone Co., embracing the Harris city stone quarries, preparatory to advertising them for sale and we are informed by those in touch with this important concern that when the sale occurs there will be bidders prepared to buy who, should they get control, will operate the quarries on a larger scale than they, large as they are, have ever known.

John H. Nevin, a wealthy quarry owner, shot the top of his head off in Ogdensburgh, N. Y. He was a bachelor. His age was 61. No motive for the suicide is known.

Houghton, Mich,—Slate of promising quality has been found near Covington. There were sheets as large as two by four feet and one-quarter inch in thickness. There are extensive quarries at Avon, Baraga county, but for several years they have been unworked.

Charleston, S. C.—The Winnsboro Granite Co., stockholders held annual meeting recently, and re-elected James F. Redding President of the company, and Leon C. Ferral, Secretary and Treasurer. The board was re-elected as follows: George A. Wagener, T. W. Woodward, Hall T. McKee, William E. Holmes, H. E. Young, James B. Keckeley and James F. Redding.

The sixteenth anual meeting of the stockholders of the American Bangor Slate Company was held at Easton, Pa. There was a large attendance on the part of the stockholders, and the reports of the officers were encouraging. The company decided to erect two more hoists at the quarry. The directors for the ensuing year were elected as follows: General Frank Reeder, Conrad Miller, J. E. Long, Cotton Any, H. J. Reeder, Charles Stroud Colbert and Charles S. Ford. The directors organized by electing General Reeder, president; C. Miller, vice preident; Cotton Any, general manager; J. E. Long, secretary and treasurer; auditors, C. N. Miller and C. S. Ford; Executive Committee, Conrad Miller, C. S. Ford and J. E. Miller.

Dunbar Bros. & Clapham have recently started up the Coolidge quarry at West Sullivan, Me., which has been silent for two years. About eighteen paving cutters are employed. Business prospects are much brighter than last year at this time, and the men are looking for a rise in prises.

Williamsburg, O.—Joseph Hancock, marble, etc., destroyed by fire; not insured.

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Frank M. Carter has opened steam marble works at Morgan's Bay, Me.

The Terre Haute (Ind.) Mosaic, Tile and Marble Company's plant was sold at sheriff's sale to Russell W. Bowsher. The persoual property brought $700 and the realty $525.

The Knox Rock Blasting Company has entered suit against the Diamond, Kyune and Castle Stone Company, Salt Lake City, Utah, alleging that the defendant agreed to pay to the plaintiff $1,000 per annum as a royalty for the use of a method of blasting rock, covered by letters patent owned by the plaintiff, and that for the year ending March 31, 1894, there is a balance of 282.59 due, for which judgment is prayed. For a second cause of action it is alleged that the defendant was given $500 to hold in trust for the plaintiff, pending the determination of a certain suit brought by plaintiff against Victor Anderson *et al.* The suit was determined in favor of plaintiff, who now asks judgment against this defendant for the $500 so held and interest, which amounts in all to $527.50.

Boston, Mass.—Before Judge Aldrich, in the United States Circuit Court, was begun the trial of the action brought by John Kivinen vs. the Cape Ann Granite Company, to recover $5,000 for personal injuries sustained while in the defendant's employ last June, at its quarry at Gloucester, owing to the falling of a derrick, through its alleged negligence.

Woodbury, Vt.—The Woodbury Granite Company has practically suspended operations. They have been sued for $40,000 by the Holden Company, of Bennington. It is common talk that this is a scheme to freeze out some of the lesser stockholders of the company.

St. Louis, Mo.—The St. Louis Quarry and Construction Company filed an application in the United States Circuit Court for a receiver for the A. F. Abbott Granite Company of Knob Lick, Mo. The application was heard by Judge Adams, and the defendant cited to appear on Dec. 3, to show cause why the application should not be granted.

It is reported that the Granite-Cutters' National Union has decided upon a minimum scale of wages of $3 a day in all parts of the country, to go into effect Jan. 1, 1900.



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The Kootenai (Idaho) *Herald* says the stone quarry at Galena Landing is to be opened to furnish the Great Northern with granite for the masonry to be used in their new bridges and culverts. The company is replacing many of their wooden structures with masonry and steel.

Rollingstone, Minn.—Rumor has it that a new stone quarry will be opened in the near future on John P. Hilbert's farm west of here.

Pasadena, Cal.—The Terminal Railroad officials are negotiating with contractors to grade about two miles of track, from above the pumping station at Devil's Gate to and along the edge of the Arroyo to Millard's Cañon, and into the cañon to a large ledge of rock. This spur will be about two miles in length, and the surface stone will be used in building levees in the Los Angeles river for the protection of the Terminal tracks. The work will be begun at once. It is believed that below the surface the stone is suitable for building purposes, and experts assert that the surface indications point to an exceptionally fine quality of building and block granite.

A tract of one hundred acres of pure marl in Climax township, Kalamazoo county, Michigan, has been purchased by New York capitalists, who will engage in the manufacture of cement.

Contractor Alfred Flood, of Waterville, Me., has leased a place on the stony eminence on the road to Fairfield Center and will open a quarry for building stone.

H. B. Brown, of New York, who recently bought the lime kiln property near the north end of Islesboro, Me., has the plant nearly ready for operations. He also intends to build a tramway for hauling out the grout and taking kiln-wood from the wharf to the kilns.

On the farm of Alonzo Casey, five miles from Bangor, Me., there has been discovered a ledge of black granite, samples from which have been worked to such a degree of fineness that there is a prospect of actual quarrying at no distant day. The portion of the farm in which the ledge lies has been purchased by Dr. H. F. Hanson, of Bangor, together with Appleton S. Perkins and Charles H. Perkins, of Hermon, who will form a company and prosecute the marketing of the stone.

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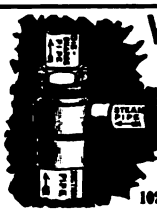
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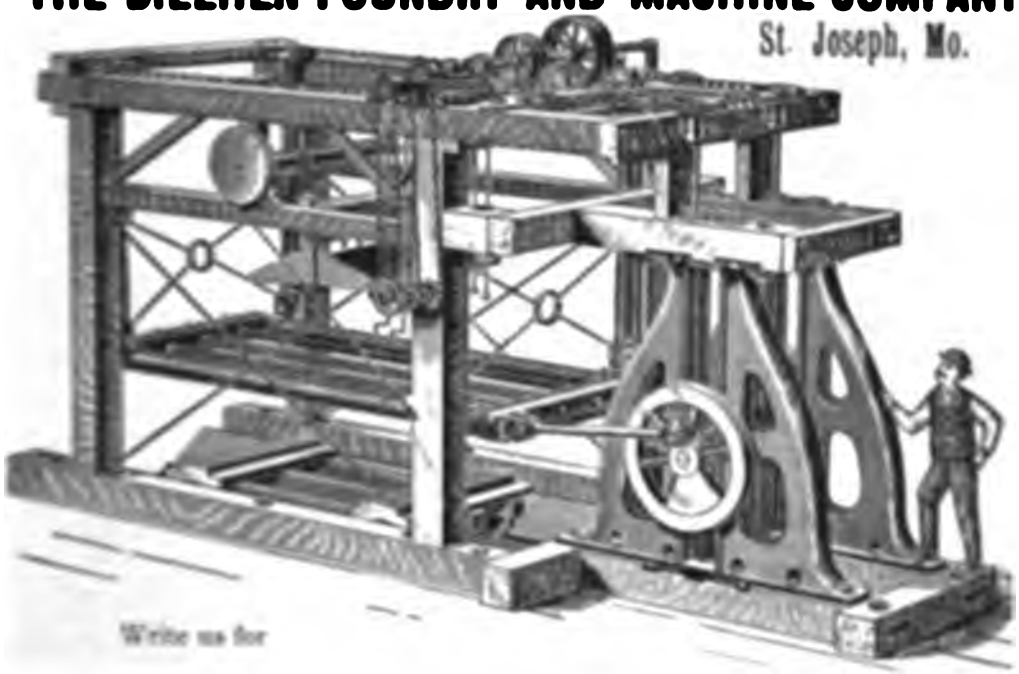
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Anderson, Ind.—Two months ago Hussey & Co., of this county, took up a barren farm in West Virginia to secure a debt. They thought it valueless, but it develops that it is a small Klondike. A cave was opened on the farm and it has been found that the finest of onyx underlays the farm, or a portion of it. Some of the precious stone was taken out and upon being examined by experts pronounced equal to that imported from Mexico.

Cleveland, O.—The strike at the Cuyahoga Marble and Stone Company's works has been settled. The men went back to work. A number of concessions were made by the company, while some concessions were made by the men.

W. Carnes, of East Barre, Vt., has moved a derrick and polishing machine to Waits River, for the purpose of developing the marble quarries located there. This marble is similar to the Washington product, and is claimed to be more durable for monumental purposes than the latter.

Papers have been served on Carpenter Bros., the quarrymen, in a suit for $50,000 damages brought in the New Jersey Supreme Court by Bernardo Giovannoni, proprietor of the Palisades Villa Hotel, at Coytesville, N. J. He claims that their quarry blasts drove all his custom away and ruined his business.

Youngstown, O., Dec. 1.—Taking effect today the wages of all employes of limestone quarries in the Mahoning and Shenango valleys, including the Bessemer Limestone Company, Carbon Limestone Company, Johnson & Co., and John R. Grist, who are the largest concerns in the business, were advanced from 10 to 20 per cent. The advance was entirely voluntary, no demand having been made by the employes, and is due to the great demand for limestone. Every furnace in the two valleys, with one exception, is in blast and pushed to its largest capacity to fill orders booked during the past month.

Gray granite has been found in Miller county, Missouri, existing there without the slightest authority or warrant from the geological reports from the state.

The Consolidated Stone Company, in Monroe county, Indiana, has discontinued its night runs. The quarries have been working a night force for the past three months.

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Three suits were begun in the Superior Court Nov. 26 against the Cut Stone Contractors' Association, of Chicago, asking for damages aggregating $75,000. The plaintiffs are Frank F. Judge, C. May & Co., and August Baumann & Co., contractors and builders, and they allege that, unknown to them, more than fifty other cut stone contractors organized the association, and that the members of the organization have with malicious intent conspired to establish a boycott against them and other contractors not members. The plaintiffs further allege that the association has conspired to secure to its members an unlawful monopoly of the business of cut stone contractors in Cook county and that the association has also endeavored to prevent the plaintiffs and other non-members from purchasing or procuring building stone necessary to carry on their business. It is also alleged that the association has tried to prevent the plaintiffs from employing stone-cutters and other workmen required in the business, and also to prevent persons about to erect buildings from entering into contracts with them. The names of more than fifty firms are given as members of the Cut Stone Contractors' Association and they are made defendants to the suits.

The G. Reed Stone Company has been organized at Bridgeport, Conn., with a capital of $5,000 in 100 shares of $50 each, $1 paid in. The subscribers are: George R. Stone, 50 shares; A. S. Miller, 40; J. Frank Stanton, 10 shares.

The Indiana Quarries Company, of Bedford, Ind. Capital, $10,000.

Kansas City Marble and Lime Company, of Kansas City; capital stock, $100,000. Incorporators, Charles D. Whiting, Frank A. Green, Lloyd Allen, and others.

Kaukauna, Wis.—H. R. Falk has sold out the Fox River Marble and Granite Works to the former owner, A. Jenss.

It is a notable fact that in making the call for bids for marble to complete the new postoffice building at Washington, D. C., the supervising architect omitted to mention Georgia marble among those from whom he wished to receive bids. This fact was called to the attention of Senator Bacon, who protested against the omission of Georgia marble from the list and demanding that it be inserted. The matter is of the utmost importance to Georgia, as all the new buildings in Washington are to be finished in marble, and the precedent of omitting it from the list once set might never be overcome. Senator Bacon says that the officials in Washington are very well aware of the suitableness of Georgia marble for the purposes for which marble is required on the new postoffice building, as the new Corcoran art building, of Washington, is of Georgia marble. He will continue to protest against the omission of Georgia marble from any call for bids emanating from officials in Washington, and will demand that it be put in while he is here and on his return to Washington.

Watervliet, N. Y.—Wm. Toohey, marble and granite dealer, deceased.

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IS SOMEBODY PEEPING?

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'S SON'S BOOK' HELPING.

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STONE

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THE USE OF STONE IN SKELETON CONSTRUCTION



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nearly all the wall space and we see twenty stories of masonry supported by stone piers scarcely sufficient in size to support their own weight, and stone beams or flat arches three feet deep carrying a superimposed load of hundreds of tons over a span of twenty feet. We can hardly, however, class this as an architectural fraud, for it is self-evident that the stone is not doing the work as represented.

However applied, stone has become very popular, at least, as a covering for the fronts of steel constructed buildings, and while it plays no part in the structural strength of the building, it still has its own duties to perform in affording a protection against the weather both for the interior of the building and for the steel work. So, from the top of the beam at one floor level to the bottom of the one above, it is a stone wall, and as such acts an honest part, and it is an error to say that a steel skeleton is covered with a veneering of stone, for the stone is a necessary part of the structure, and the completed wall is a combination of stone and steel in which each material has its duty to perform.

During the period when the steel skeleton constructed building was first being brought into use, the question was often asked whether two materials, of such different physical natures as stone and steel, could be joined together to form a solid whole. This question has been well answered by the number of examples we have, in none of which have the different rates of expansion and contraction damaged a building. This difference is not as great as most people would suppose. For a rise of 100° in temperature, steel expands one-eighth of an inch in sixteen feet. For the same rise in temperature, granite expands one-eighth of an inch in twenty feet, and marble one-eighth of an inch in eighteen feet. According to these figures, since the stone is exposed to the extremes of temperature and the steel is protected, we might infer that the stone expands or contracts more than the steel. However this may be, since no practical inconvenience is produced, we will let the question drop, and confine our attention to methods of building the masonry to the steel.

The typical steel skeleton building is one in which the frame of steel is designed to carry all permanent and temporary loads and convey such loads through its columns to the column foundations, and among the permanent loads is included the weight of the walls. The walls rest on beams, commonly called spandrel beams, at each floor level, and thus each wall is the height of one story and has only its own weight to sustain, whether it incloses the first or twentieth floor rooms.

The problem that presents itself to the architect is to construct a wall to fill up a rectangular opening in the side of a building. As a foundation for this wall he has a steel beam, or a combination of beams, to limit its height; he again has beams similar to the foundation beams, and to limit its extent

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laterally he has steel columns. The foundation beams are designed to carry the weight of the superimposed wall with a minimum amount of deflection and the wall must be designed to be as light as is consistant with strength and its efficiency as a protector against the weather. It is better that this wall should be entirely of stone than of brick with a stone facing.

As steel buildings are at present constructed, another condition to be fulfilled is that all beams and columns must be protected against the weather. This will necessitate the outside of the beams and columns being at least 8° within the building line.

Since the architectural lines of every building are somewhat different the spandrel beams must be designed, or rather modified, to meet the special cases, and in order to arrive at the most substantial results the architect and the designer of the structural steel should work in unison. Generally the architectural lines of a building, and its adornment, are designed first, and then the structural steel frame is designed to carry a wall of known shape and weight. This is practical, for before an engineer can design a girder to carry a load he must know its weight and how it is to be applied. But still if this method of procedure is carried too far, and the lines of the building as first laid down, before the structural part has been considered, are strictly adhered to, almost impossible problems may be presented to the designer of the frame, and unnecessary expense incurred. Therefore, the structural engineer, when he finds he is being led into too complicated and expensive construction, should consult the architect, and where possible, without injuring the appearance of the building, the original lines should be changed. This architectural change for the most part would consist of a slight change in design or position of pilasters and cornices and some unimportant angles on the exterior of the building.

As in all masonry, the foundation for the curtain wall is of greatest importance. It seems strange at first sight that no standard construction has been agreed upon for this part of the skeleton construction; but when we consider the short time in which this form of architecture has had to develop, and the fact that most of these frames have been constructed by different engineers, each having his individual ideas in regard to a new form of construction, and the variation in decorated front to be supported, the variety we meet with in this detail is not to be wondered at. A long list of details could be shown of combinations of I beams, channels, Z bars, and angles that are now in use, but since these would be uninteresting to the general reader, and those particularly interested in this form of construction can procure them from books and articles on individual buildings, we will confine ourselves for the present to generalized methods and principles.

Besides carrying the wall, this beam serves as a floor girder to receive the ends of the floor beams, or as a floor beam, and as such receives its part of

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the floor load, therefore its position must be at a floor level. Its position is also limited between the top of one window and the bottom of the one above. In the horizontal plane its position is very much limited, owing to the fact that its ends are to be connected with the columns.

In regard to the manner of loading this spandrel beam we have first the cornice, or horizontal band of stone ornamentation, which in the architectural design is between the windows and on about the same elevation as the spandrel beam, so we can assume that this work will be fastened directly on the outside of the spandrel beam. From this band to the next band above we have the wall, or rather since the wall is mostly windows, the mullions between the windows. Thus we have two kinds of loading, a uniform loading and a loading at intervals along the beam corresponding to the window spaces. Now neither of these loads are over the center of the web of the beam, but are applied externally by means of supports built to the outside of the beam, and tend to produce a twisting moment in the beam which carried to the columns produce the effect of an eccentric loading there. Where the outside wall is of stone and extends out well from the steel frame this twisting moment is quite an item, and must be balanced by having the floor beams at right angles to the spandrel and attached to it, in this way the structural problem becomes one of the cantilever, the supports for the stone work being a continuation of the floor beams with the spandrel acting as a fulcrum and receiving its load centrally and vertically. For causes of economy, the spandrel beam is generally a deep girder (a plate girder). Now the floor beams instead of ending at this girder can project beyond it, and thus form a shelf on the outside of the structural frame, on which can be built a stone wall of any design. If the spandrel beam can be placed so as to receive the floor beams on its top flange the construction is very simple, otherwise it receives the floor beams somewhere on its web and the continuation of the beams are formed by riveting on the outside of the spandrel. It would give a better form of construction if all supports for walls were built as above, but generally if floor beams are perpendicular to the front wall they are parallel to the side walls, and to have the floor beams making right angle connections with all four walls would cause a little complication in construction at the corners of the building. By so doing, however, we are following correct principles of construction and obviating the undesirable twisting that is produced by loading a detached beam on one side. In all structural steel work, except the skeleton of a steel building, all parts of the construction are in view and the steel can be easily examined to see how it is standing usage, and can be constantly repainted as a protection against rust, and when different members show weakness they can be replaced. But when once the steel of a building is covered with masonry it will never see the light of day again, except in the case of fire or the destruction of the

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The architect's first aim seems to be to hide all the structural steel work and give the front of his building the appearance of one solid wall of masonry; then he turns his attention to adornment, and we have presented to our view, in cities where high buildings thrive, all manner of walls, from the rigorously plain to the one on whose face every architectural adornment ever conceived finds a resting place. At first sight some of these fronts may please and awe by their striking appearance, but if we see more of even the finest, we admire it less and look upon it as a most unnatural stone wall, and a feeling that a fraud has been perpetrated grows upon us. The use of steel in the structural part of architecture has produced a revolution, but into architecture as an art it has not entered. True, architecture is an adornment of the materials of construction, and since our ideas of architecture are gotten from a time when the use of steel was not known, we associate all architectural effects with the materials used in former times. But now, however, since steel is playing such a part as an architectural material of construction, the time is sure to come when the art will recognize it, and not until that time can we hope for pleasing architectural effects in steel construction.

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ESTHETIC VALUE OF MOULDING AND PROFILE.*

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That barbaric period, the offspring of anarchy and confusion, is followed by another, still Romanesque, but more homonogeneous, the mouldings of which attain a great perfection and diversity—Romanesque of the eleventh, twelfth, and part of the thirteenth centuries, of which Figs. 11 to 13 give an idea.

From this period to the end of the last century the form and expression

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which I now believe ended, I think the country can look forward to an era of unprecedented prosperity. Nor do I think we shall be obliged to long await its coming.

The wisdom displayed by the business world during the last four years is now beginning to bear fruit in the restoration of confidence; an increased volume of trade in many lines is apparent.

The higher prices received for the products of the farm will enable the purchase of machinery, and thus furnish employment for the laborer and mechanic, necessitate an increase in the size of the mills, in the construction of which stone will be required. The profits of the mill-owners and manufacturers will find investment in real estate and the construction of buildings to meet the needs of a constantly increasing population. This is as sure to follow as the sun is sure to rise.

When this condition of things prevails—and I look for it at no distant day—we may expect fifteen more years of uninterrupted prosperity in the stone trade.

POLISHING MARBLE.

POLISHING includes five operations. Smoothing the roughness left on the surface is done by rubbing the marble with a piece of moist sandstone; for mouldings either wooden or iron mullers are used, crushed and wet sandstone, or sand, more or less fine, according to the degree of polish required, being thrown under them. The second process is continued rubbing with pieces of pottery without enamel, which have only been baked once, also wet. If a brilliant polish is required, Gothland stone instead of pottery is used, and potters' clay or fullers' earth is placed beneath the muller. This operation is performed upon granites and porphyry with emery and a lead muller, the upper part of which is encrusted with the mixture until reduced by friction to clay or impalpable powder. As the polish depends almost entirely upon these two operations, care must be taken that they are performed with a regular and steady movement. When the marble has received the first polish, the flaws, cavities, and soft spots are sought out and filled with mastic of a suitable color. This mastic is usually composed of a mixture of yellow wax, resin and Burgundy pitch, mixed with a little sulphur and plaster passed through a fine sieve, which gives it the consistency of a thick paste; to color this paste to a tone analogous to the ground tints or natural cement of the material upon which it is placed, lampblack and rouge, with a little of the prevailing color of the material, are added. For green and red marbles, this mastic is sometimes made of gum lac, mixed with Spanish sealing wax of the color of the marble. It is applied with pincers, and these parts are polished with the rest. Sometimes crushed fragments of the marble worked are introduced into the cement,

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mations of the earth. The experiments have been made chiefly with pure Carrara marble. Columns of the marble 2 centimeters and 2½ centimeters in diameter and about 4 centimeters in length were very accurately turned and polished. Heavy wrought-iron tubes were then made, imitating the plan adopted in the construction of ordnance, by rolling long strips of Swedish iron around a bar of soft wrought-iron, and welding the strips to the bar as they were rolled around it. The core of soft iron composing the bar was then drilled out, leaving a tube of welded Swedish iron 6 millimeters thick, so constructed that the fibers of the iron run around the tube, instead of being parallel to its length. This tube was then very accurately fitted onto the column of marble. This was accomplished by giving a very slight taper to both the column and the interior of the tube, and so arranging it that the marble would pass only about half way into the tube when cold. The tube was then expanded by heating, so as to allow the marble to pass completely into it, and leave about three centimeters of the tube free at either end. On allowing the tube to cool a perfect contact between the iron and marble was obtained, and it was no longer possible to withdraw the latter. Into either end of the tube containing the small column an accurately fitting sliding steel plug was inserted, and by means of these the marble was submitted to a pressure far above that which would be sufficient to crush it if not so enclosed. Under the pressure, which was applied gradually and in some cases continued for several weeks, the tube was found to slowly bulge until a very marked enlargement of the portion surrounding the marble had taken place. The tube was then cut through longitudinally by means of a milling machine along two lines opposite to one another. The marble within, however, was still firm, and held the respective sides of the iron tube, now completely separated, so tightly together that it was impossible without mechanical aids to tear these apart. By means of a wedge, however, they could be separated, splitting the marble through longitudinally. The column in one experiment was reduced from 40 millimeters to 21 millimeters in height. The deformed marble differs from the original rock in having a dead white color, the glistening cleavage faces of calcite being no longer visible, and although not so hard as the original rock, it is still firm and compact, and especially so when its deformation has been carried out very slowly. The experiments show that limestone, even when dry and at ordinary temperature, does possess a certain degree of plasticity, and can be made to "flow," the movements set up developing many structures which are characteristic of rocks which have been squeezed or folded in the deeper portions of our earth's circuit.

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THE COFFER DAM PROCESS FOR PIERS VI

the pier for the Baltimore street bridge at Cumberland, Md., are shown in Fig. 50, and this was described in the *Engineering News* of July 21, 1892, by H. P. Le Fevre, engineer in charge. The frame was built in place on two canal-boats and after completion was suspended from the old Bollman truss which the new bridge replaced.

The depth of the water was four feet, and about six feet of very loose quicksand and small round pebbles overlaid the hard bottom.

After the boats were removed, the frame was lowered to its place, the sheet piling driven and the dam pumped out with a six-inch pump. The foundation was laid on the hard bottom under the quicksand, after this had been removed.

The grillage was made of two courses of 15x15-inch clear white oak, around which was built a framework, and the open spaces of the grillage were then filled with a concrete, made up of one part of Cedar Cliff cement to two parts of sand and four parts of hydraulic limestone, broken to pass

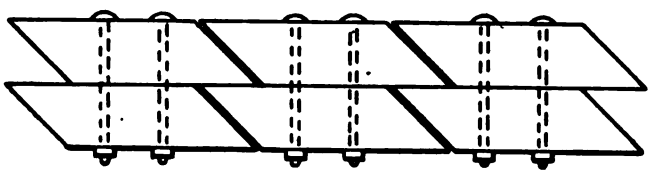


FIG. 48—COMPOUND SHEET PILE.

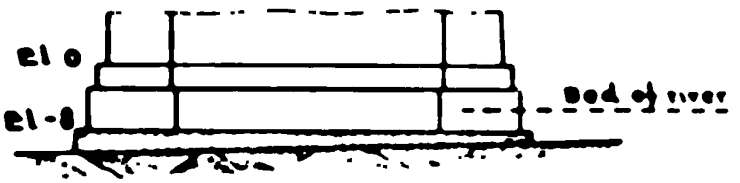
through a two-inch ring. Upon this was laid the footing courses of the masonry.

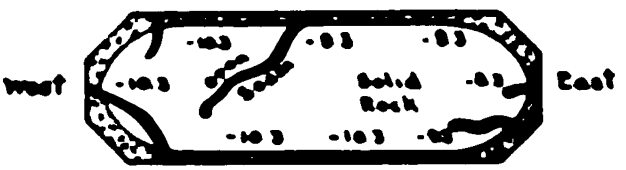
Another ordinary sheet pile coffer-dam which gave good satisfaction, was used at the Sandy Lake dam on the Mississippi River, by Major W. A. Jones, corps of engineers, and as the account contains so much of value, it will be quoted in full from the 1894 report of the Chief of Engineers.

"The coffer-dam is composed of two rows of round piles, twelve feet from center to center of piles, with the exception of sixty-two feet of the east end of the upper part, where they were driven fourteen feet from center. The piles in each row are eight and one-half feet from center to center, cut off at an elevation of 1217 feet above sea level and capped with 12x12 inch timber. The inside row of sheeting is 4x12 inch, and the outside 6x12 inch plank. The sheeting is cut off at an elevation of 1218 feet above sea level, or two feet below the flowage line. One-inch rods of round iron, eight and one-half feet apart, pass through the caps to prevent the filling from spreading the two lines of sheeting at the top.

In May, 1892, when a flood occurred, the outside of the cofferdam was raised three feet by splicing three-inch planks to the outside row of sheet-

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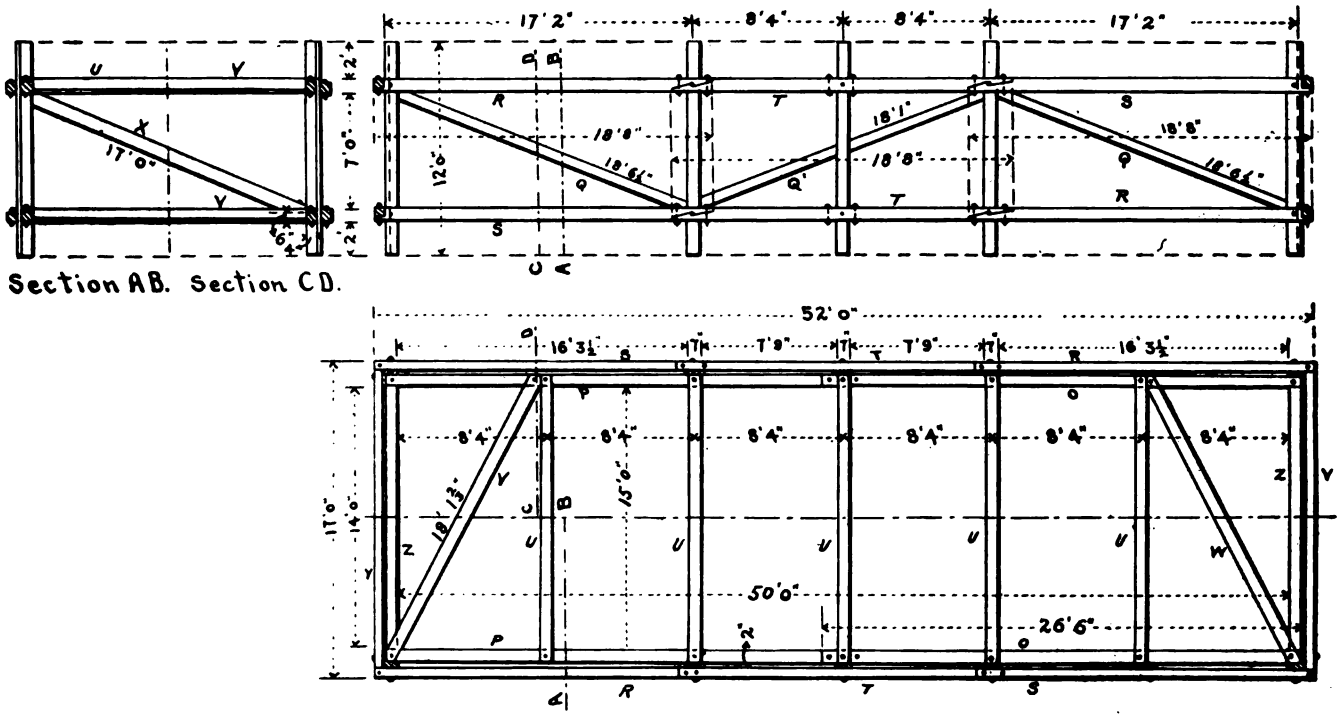


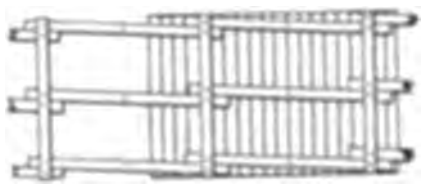
FIG. 50—FRAMEWORK OF COFFER-DAM, CUMBERLAND, MD.

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[illegible] keeps the material around the pile [illegible] than it would be [illegible] from ringe of [illegible] pile. The N [illegible] the head of the pile

[illegible] is very important to keep [illegible] around the pile [illegible] it has been [illegible] until [illegible] when the material has settled [illegible] part of the [illegible]

[illegible] was driven by a pile driver [illegible] by a set of water [illegible] and [illegible] In driving all sheet piles a cast [illegible] was [illegible] the head of the pile. On the upper side of the [illegible] a wooden rack of some seasoned [illegible] wood [illegible] the head of the hammer. This device saves the head of the pile [illegible] and the pile can be driven to a greater [illegible] than [illegible] without it



[illegible]

[illegible] the sheet piles a groove was made on the [illegible] and [illegible] was [illegible] to the [illegible] and [illegible] and [illegible] at the [illegible] pile [illegible] was [illegible] to a diameter of about three eighths inch. The [illegible] was [illegible] to the bottom of the pile and the sand [illegible]

The [illegible] the sheet piles with gravel when the [illegible] the [illegible] gravel. The [illegible] the [illegible] [illegible] Another [illegible] was [illegible] and passages [illegible] between the piles and [illegible] the hammer. The piles and [illegible] were [illegible] to the bottom [illegible] the piles [illegible]

The [illegible] the Main street [illegible] Rock Area [illegible] [illegible] piles [illegible] [illegible] [illegible]



FIG. 52—COFFER-DAM AND CONCRETE PIER, LITTLE ROCK, ARK.

the grillage being 12 and 13 feet wide by 34 feet long and resting on forty-eight and sixty piles respectively, the piles being of good sound oak or pine at least eight inches in size at the small end and not less than twelve inches at the butt when sawed off.

The coffer-dams were constructed, as can be seen from the view in Fig. 52, by driving guide piles, to the top of which are drift bolted square guide timbers. The sheet piling of three-inch tongue and groove stuff was driven against the outside of this timber, and the excavation banked up against

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the work. They gave excellent satisfaction and caused little trouble as the water was shallow.

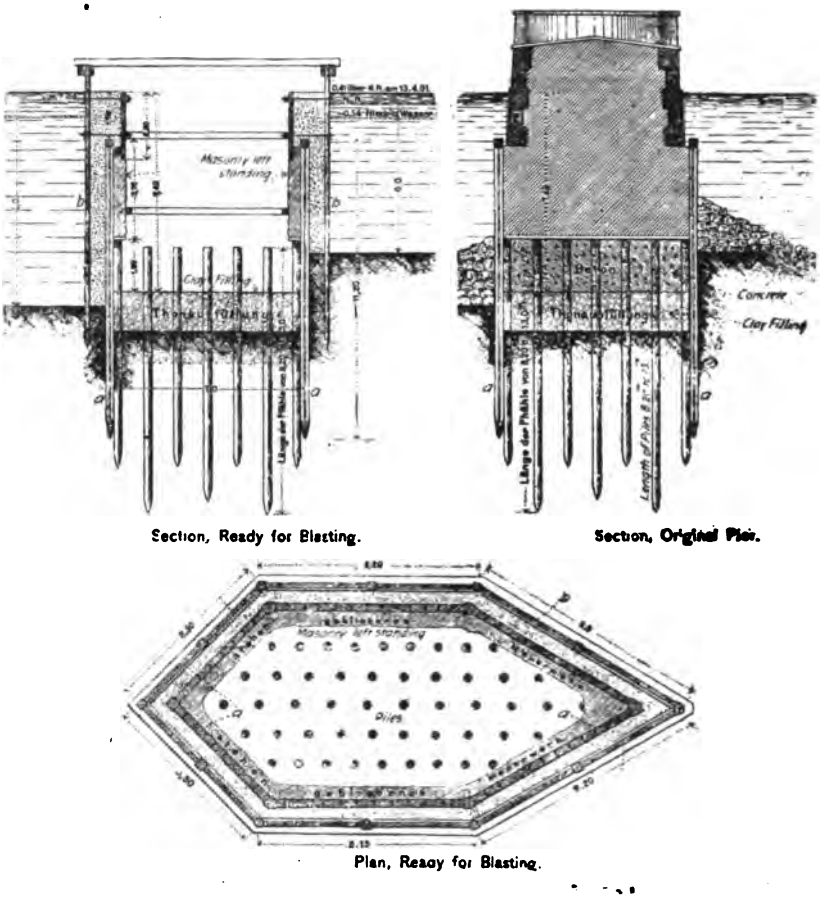
The piers were constructed of Portland cement concrete, the facing of the exposed faces being a mortar of one part of cement to two parts of sand, and the backing was of concrete of one part cement, three parts sand and six parts of broken stone.

Where sheet piles are to be driven on rock bottom or through earth on a rock bottom they should be driven hard enough to bruise up and form a cement with the rock. This has been accomplished also by driving the piles with a thin edge until they fit the rock bottom, when they are withdrawn and after cutting them to conform to the contour of the rock they are driven in, forming a tight joint. This method will be very good to remove in general also.

Other dams are sometimes constructed for the repair or removal of existing piers. A pier which was constructed in 1841 in the river Parnitz at Stettin, Germany, became an obstruction to navigation and it was decided to remove it. The work was described in the *Engineering News* of October 18, 1894.

The entire pier was built as a single mass in hard Roman cement and sand concrete, the construction of a coffer-dam being thus avoided. The general dimensions of the pier were as follows: The upstream face was built in steps, the lowest step being 3 feet wide and 3 feet high, the next step 2 feet wide and 3 feet high, and the top step 1 foot wide and 3 feet high. The downstream face was built in steps, the lowest step being 3 feet wide and 3 feet high, the next step 2 feet wide and 3 feet high, and the top step 1 foot wide and 3 feet high. The pier was 30 feet wide at the top and 36 feet wide at the bottom. The pier was 100 feet long. The pier was built of concrete composed of one part cement, two parts sand and four parts broken stone. The concrete was mixed in a mixing machine and was deposited in the pier by means of a chute. The concrete was allowed to set for 24 hours before the pier was loaded. The pier was loaded with stone to a depth of 10 feet. The pier settled 1 foot 6 inches in the first 24 hours and 3 inches in the next 24 hours. The pier settled 1 foot 9 inches in all. The pier was then unloaded and the stone removed. The pier was then relo

tinued. A shell of the latter, however, was left standing. Then the timber platform on which the masonry had been resting and the layer of concrete below were taken out, exposing a layer of clay underneath. While attempting to pull one of the foundation piles a stream of water rushed through the opening thus formed, so that this plan had to be given up and blasting re-



Section, Ready for Blasting. Section, Original Pier.

Plan, Ready for Blasting.

FIG. 53—REMOVAL OF MASONRY PIER AT STETTIN, GERMANY.

sorted to. To do this the tops of the piles were bored to a depth of thirteen feet and filled with 8.8 pounds of dynamite each. The initial charges consisted of 10.6 ounces in air-tight canisters. The shell of masonry left standing received four cubical charges of 8.8 pounds each. In all sixty-eight charges, consisting of 616 pounds of dynamite, were used. The electric current for the blast was divided into three currents, each being attached to

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[illegible] The boring however did not prove to be as [illegible] was [illegible] owing to the [illegible] water and [illegible] were taken [illegible] The [illegible] away of the work was [illegible] by the [illegible] The piers which were spoilt and [illegible] [illegible] were [illegible] up by [illegible] [illegible] The work of removing the piers lasted [illegible] and the cost was about £[illegible]

A [illegible] of the removal of a pier was at Gadsden Alabama where a pier in the Coosa river had failed The pier had been built [illegible] in a water [illegible] known and was supposed to have been [illegible] [illegible] which [illegible] a large [illegible] gravel was left underneath and [illegible] [illegible] [illegible] stream [illegible] [illegible] through the [illegible] [illegible] of the river

A [illegible] had been [illegible] up to [illegible] the passage of trains and after [illegible] was [illegible] around the [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] The [illegible] was [illegible] by driving three rows of sheet piling [illegible] [illegible] sand and gravel to bed rock and [illegible] [illegible] between them

The sand and gravel over the rock was not removed from the bottom of [illegible] [illegible] before [illegible] and a great deal of trouble was experienced through the water [illegible] through the [illegible] gravel It was [illegible] that a [illegible] was made between the sheet piling and the rock

Skids were erected upon the [illegible] of the coffer dam and by driving [illegible] [illegible] and [illegible] the dam to carry a [illegible] on each side of the [illegible] which carried the drum and [illegible] the main [illegible] at the centre [illegible] had been tested by loading with [illegible] of [illegible] upon the [illegible] [illegible] [illegible] [illegible] [illegible] was at once begun upon the [illegible] [illegible] [illegible] by means of two [illegible] [illegible] on the [illegible] [illegible] [illegible] The [illegible] were made [illegible] there were [illegible] [illegible] when the pier was [illegible] and were taken to the [illegible] [illegible] again When the masonry was [illegible] [illegible] was [illegible] up and taken out after which the gravel inside the coffer dam was removed and [illegible] rock New [illegible] were [illegible] to take [illegible] of the gravel and [illegible] [illegible] and the [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] The pier was [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] The [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

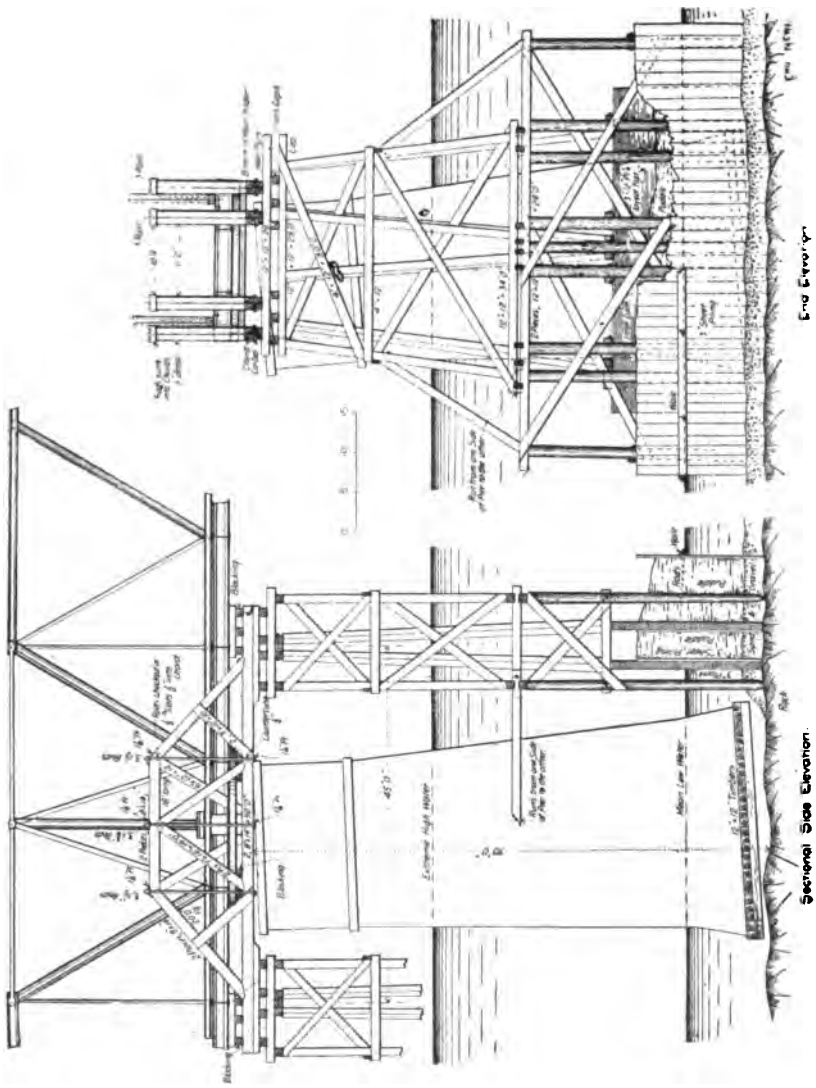


FIG. 54—COOSA RIVER COFFER-DAM.

When in position for work the dam is rectangular in shape, 62 feet long and 36 feet wide, outside dimensions, and 16 feet high. Each side consists of timber crib work 10 feet wide, making the inside dimensions 42x16 feet. At each corner there is a movable timber extending vertically from the bottom of the crib to some distance above the top. These timbers or spuds are shod with iron on the bottom, and serve to hold the dam in position while the sheet piling is being driven. The dam is divided vertically

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[illegible] ght be divided into two equal parts which can be floated separately and [illegible] desired position and afterwards joined together. Watertight [illegible] compartments are built in each section to assist in floating it and these compartments are also used to hold stone when it is desired to sink the crib.

When the two sections are united and placed in required position the [illegible] are loaded and the crib work is sunk by letting water into the water [illegible] compartments and putting in the necessary amount of stone.

[illegible] irregularities in bearing between the bottom rank and the bottom of [illegible] are corrected by adzing where blocks up where required. Cross [illegible] are mortised; blank three or four inches deep to them put on the [illegible] and added to the crib. Puddle composed of clay and gravel is [illegible] around the bottom outside and the dam is ready to be launched.

When the crib was ready for the height of the breast three tiers of [illegible] the dam was braced against the masonry.

[illegible] an enormous depth of water was encountered at Baie St. Paul, [illegible] feet at ordinary water level. Several freshets occurred during the progress [illegible] which did some damage to the dam. At one time a [illegible] was carried away and a [illegible] in the river moved it [illegible] stream about [illegible] feet. It was drawn back [illegible] and [illegible] secured. To make a [illegible] the dam to [illegible] a gang of [illegible] men required about [illegible] days. To take the dam apart and remove it about [illegible] days to put it together again; to remove [illegible] required about one to two days. Upon the [illegible] the breakage. At each [illegible] per cent had to be replaced by new [illegible]. The [illegible] was towed by a small steamboat and was found to be a very [illegible] [illegible] required after the dam was [illegible] and it saved [illegible] dollars, as the dam required little repairing and [illegible] a good [illegible] the river. [illegible] also gave us less trouble by water [illegible] than was [illegible] by the ordinary [illegible] dam. [illegible] the water [illegible] the dam [illegible] the [illegible] of the water [illegible].

The floating dam was used for the three [illegible] the [illegible] the [illegible] dam. The floating dam [illegible] and [illegible] was [illegible]. The [illegible] dam [illegible] was used at the [illegible] and [illegible] was used [illegible] twenty-four [illegible].

The [illegible] taken from the [illegible] Mr. [illegible] Mayor [illegible] W. H. Rogers [illegible] at the [illegible] the [illegible] dam [illegible] was [illegible] the

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total cost for five coffer-dams, including the two crib coffer-dams at the sides of the river, was $14,000.

The subject of subaqueous foundations has been very fully treated of in a series of lectures by W. R. Kinipple, M. Inst. C. E., before the Royal Engineers' Institute at Chatham, England.

The use of six-inch pitch pine close sheeting was made use of by him, for a quay wall in the harbor of St. Helier, Jersey. They were driven to rock or as deep as possible with a 2,800-pound hammer, and the tops cut off a few feet beneath half tide level, and clayey material banked up against the outside. The bottom through which the sheet piles were driven was sand and clay.

The rock was laid bare to a depth of as much as thirteen feet below low water and in sections which contained about 900 tons of water to be pumped out; this was done with a sixteen-inch centrifugal pump in about forty-two minutes.

Several leaks were developed under the piles, but they were promptly stopped by "stock ramming." The stock rammer which is shown in Fig. 55, is 3 inches in diameter, 3½ feet long and banded top and bottom with iron. A ¾-inch air hole is bored up from its foot a distance of twenty to thirty inches, and covered on the bottom with a sole leather flap, so that air is let in and suction prevented as it is withdrawn. The sheet piles have 3¼-inch holes bored through their sides, and cylinders of clay are inserted 3x9 inches long, similar to the work at Sault Ste. Marie. The stock rammer is inserted and driven by mauls as far as its length will permit when it is drawn out, and other charges inserted until no more clay can be driven. The hole in the pile being filled with a wooden plug.

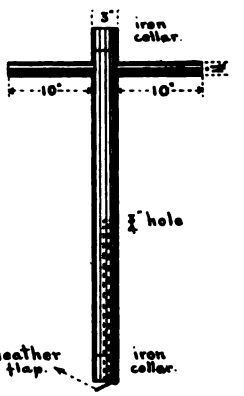


FIG. 55—STOCK RAMMER.

The piers for the Putney bridge, over the Thames, were built by the same engineer, with single pile dams to a great depth, by using fourteen-inch square piles, with elm wood tongues, and driving them down through the mud and clay to the stiff clay bottom, so that practically watertight work was secured.

In the construction of the docks at Victoria, British Columbia, he constructed a coffer-dam 500 feet in length, in a depth of thirty-five feet of water, the bottom being of rock and overlaid in places with sand and shells several feet in thickness. At the center the sand and shells overlaid a bed of clay.

Three rows of close 12x12-inch sheet piling were driven with two puddle

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[illegible] between. The gate [illegible] were [illegible] and the [illegible] were [illegible]

[illegible] the dam rested on rock at the crest's head of [illegible] were [illegible] and [illegible] were [illegible] around the crest to make the work water [illegible] [illegible] was [illegible] in October 1911 and remained [illegible] gate [illegible] the [illegible] was [illegible] over seven years later.

[illegible] at Topeka, Kansas, over the Kaw river was made [illegible] [illegible] the Melan system of concrete and steel by Keegan and [illegible] engineers is a most interesting piece of work. The [illegible] were [illegible] by the [illegible] to be water gate [illegible]



[illegible]

[illegible] of [illegible] [illegible] [illegible]

engine. The other piers were handled in a similar manner and with no particular trouble.

The growing scarcity of timber will doubless lead to the use of metal at some time in the future, to replace sheet piling for coffer dams, but where timber is abundant and reasonable care is exercised in its use, it will continue to be of great service in obtaining foundations by this method.

Charles Evan Fowler.
Asso. M. Am. Soc. C. E.

[TO BE CONTINUED.]

NEW LIMESTONE QUARRIES.

SOME years ago Mr. J. McKinnie offered for sale eighty acres of land one-half mile west of Trenton, Mich. As the property was said to contain valuable limestone, a competition arose over the purchase of the property between J. B. Ford and Church & Co., which resulted in the sale of the land to Mr. Ford. An examination did not reveal the stone in sufficient quantities to pay for quarrying, and the land has since lain idle, Mr. Ford purchasing the stone for the use of his soda-ash plants from Sibley's quarry. Recently another examination was made, and a shaft fourteen feet square was sunk down to rock. Mr. Ford now thinks he will be able to quarry stone for his own use from this land and has conveyed the necessary machinery to the grounds and begun work there. Church & Co. also contemplate doing their own quarrying, and are now looking over sixty-five acres of quarry land two miles below Trenton, now owned by Joseph Anderson. Mr. Anderson says good stone comes to within five feet of the surface on their ground.

"I take pleasure in sending you check for $2 to pay for STONE for 1898. I can assure you STONE is all right and I have taken a great deal of pleasure reading it."—*M. J. Griffin, Detroit, Mich.*

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THE CITY OF THE FUTURE

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or white lead, it is all brought into the total. Even such an insignificant thing as a difference in the quality and kind of paint used may make a ton of difference in the general weight of the structure. Every rivet in the building is accounted for, and if the ends are fused—hammered down on the opposite side of a girder—instead of being merely bolted on, the fact must be taken into account. If the roof is covered with tin, the solder which holds the plates together is put down as weighing so much per ingot. In laying the tin plates on the roof the edges of each plate are lapped over the adjoining plates to the extent of a quarter of an inch on all sides. This quarter-inch of necessary lap adds a large number of pounds to the general weight of the roof. So the process continues through the whole building. The weights of the clapboards, the plaster, the wall paper, the window glass, ths gas or electric fixtures, the cornice ornaments, and of the thousand and one materials and appurtenances which go to make up a building are considered and accounted for. In the aggregate those weights, summing up in the thousand tons, constitute merely the dead weight of the building. The live weight, such as the weight of the tenants, the furniture and their other belongings, must be added to the sum total.

An office building with a capacity of 3,000 persons would be about 165 tons lighter at night when it is deserted than in the daytime when it is occupied. In office buildings it is customary to estimate about 100 pounds of live weight to the square foot. In residences about seventy pounds to the square foot are calculated upon. In manufacturing establishments it is customary to allow for at least 150 pounds to the square foot. The buildings themselves press down upon the earth at the various rates of from four tons to the square foot to twelve or fourteen tons the square foot. The tall St. Paul building in New York is estimated at the latter figure. The Surety building mentioned above is estimated to exert a pressure of six tons to the square foot.

A curious part of this business is the testing of the ground on which tall buildings are to stand. Nearly every tester has his own method of ascertaining earth resistance. Some do it by hydraulic pressure, some by pile driving, some by driving down into the earth a "worm" which picks up dirt, gravel and sand at various distances and conveys them to the surface to be examined. The hydraulic method is pursued by constructing a box or casing, which is fastened tightly to the ground. In it a plunger, operated by water pressure, is made to press down upon the earth. The force with which it presses down upon the ground is determined by its resistance to the inflow of the water which is ascertained beforehand. In driving piles they are simply forced down until they will go no further. This is done at various points over the ground on which the forthcoming structure is to be built. Of course, the depth of this point of greatest resistance can be

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is sure to be a curve in the nearby street lines. Recently in New York, at a deep excavation, a person could be going some distance up, gaze along the car tracks and discern part of an immense quadrant, formed by the tracks where they had followed the sinking of the ground toward the excavation.

Why does not a big building topple over? is the question asked by the observer. It would seem that the action of the winds, rain, sun and elements generally ought to cause it to fall. It could not for several reasons. In the first place, every part of the structure is bolted to the adjoining parts by means of steel rivets, which are inserted hot, and which, as they cool, draw the various pieces of steel together with a force that almost accomplishes molecular adhesion. The building thus becomes a unit above ground. Below ground, as has been pointed out, the caisson system of construction admits of no disintegration. On the other hand, the line inside of which the center of gravity exists lies so far outside the building that it could not possibly topple. The basement construction is such that the whole affair resembles a telegraph pole, which would first have to get out of its hole in the ground before it could fall. The same conditions exist in turnstile bridges. The base or pivot on which the bridge turns is so broad that the outstretched arms could not possibly tilt the whole structure. In the new Third avenue bridge in New York City each arm extends out 120 feet beyond the central turnstile. In order to topple, sufficient weight would need to be placed on one arm to overcome the weight of the other arm and the heavy central base. As the bridge weighs, all told, nearly 3,000 tons, this would be practically impossible. A piece of heavy ordnance is hung on its trunnions merely by calculation. The center of gravity is needed, of course. The center of gravity of every part of the gun is calculated first. Then the relation of these centers to the general center is ascertained by computation. Engineers are able to determine it within a small fraction of an inch. In short, the weighing of ponderous objects is part of a special science—the science of extremely delicate computation.—Theodore Waters in Star Sayings, St. Louis.

EMPLOYERS AND WORKMEN.

THE relationships between employers and workmen in the building trades involve other and more important questions than those with which the two have generally familiarized themselves. It is obvious that the conditions surrounding that part of the building business which affects the employer in his relation to the workman or the workman to the employer are the outgrowth of conditions and customs that have been set up and established by employers and workmen in the past. The questions

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also fail to count the cost in resentment and hostility which inevitably follows defeat. In many cases the cost in money alone seems to teach that strikes and boycotts should be resorted to only in the most extreme cases. If, for example, the power of the workmen were sufficient to absolutely control the employer, so far as his relations with the workmen were concerned, there is no reason to suppose that those relations would be ust, even under the supposition that the employer would be able to continue in business. One side cannot with justice arbitrarily fix the conditions for both; for although their interests are mutual they are not identical.

WHEN HARMONY PREVAILS.

It is obvious that so long as hostilities are maintained harmony cannot be established. So long as employers in the building trades refuse to organize into representative bodies, and so long as they refuse to recognize the right of workmen to act in a body, so long will hostilities continue and so long will harmony be postponed. Without representative organization the employers are at the mercy of concerted action by the workmen, and so long as they continue weak so long will they invite trouble and defeat. It is not surprising that employers refuse to concede some of the demands of the workmen; for, by refusing to meet with them for the determination of what might be demanded justly, the workmen are compelled to evolve unaided their own conclusions as to what they believe to be just demands, without the least assistance from the only source that could set them right—the employer. It is not strange, therefore, that the one-sided conclusions of the workmen should appear one-sided to the unrepresented employers, for they are one-sided. It is, however, the refusal of the employers to actively admit the mutuality of interest by joining with the workmen for the purpose of ascertaining the rights of each that forces the latter into the one-sided conclusions to which the employers object. A mutual interest cannot be mutually protected without mutual action; and the blind opposition of employers to the action of the workmen not only offers no safe or permanent protection to their own interests, but invites aggression by the workmen.

In order that the rights of employers and workmen may be defined and understood by both, it is necessary that the two confer upon all questions at issue. In place of endless compromise and palliation, which defines nothing and, in reality, settles nothing, and which continually leaves one side at the mercy of the other, differences should be investigated in joint action and the rights of each defined, established and maintained. Every case in which the helplessness of one side forces it to yield to the strength of the other is a potent cause of future disturbance. The weaker side, whose rights have been overridden. will bide its time waiting for an opportunity to strike

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[illegible]

[illegible]

[illegible]

where effect and style is desired, without regard to cost, the demand is for the costly foreign marbles. For stores and in combination with other marbles there is a demand for the East Tennessee marbles, which are splendid for the use to which they are put. The demand for these marbles is increasing.

For outside work the demand now is for the marble from Georgia and is the pure white variety which is one of the best exterior marbles. The gray marble of this locality is fine, as is shown by the postoffice building and the Sevier monument.

"The quarries of this section are fine and from them has been obtained some of the best marbles of the country. Our firm is building the state capitol of Rhode Island of marble and several of the buildings of the new Columbia college at New York. The interiors of these buildings are not far enough along to let the contract for the finish, and just what marbles will be used cannot be told."

SUCCESSFUL CEMENT MAKING.

IN many sections of the United States are to be found inexhaustible deposits of limestone containing so much magnesia that it is unfit for the manufacture of Portland cement; but it is easily calcined and ground, and, in a neat test, it developed a tensile strength in seven days of 200 pounds, and in twenty-eight days of 300 pounds. Since 1880 this "Rosendale," or natural rock cement, has been used in large quantities. In 1896 the United States produced and used 7,960,450 barrels, at a valuation of $4,049,202, or a trifle more than 50 cents per barrel, in bulk at the mill.

Germany produces annually about 13,500,000 barrels of Portland cement, exporting about 3,000,000 barrels, and consuming the remainder. It is estimated that the United States will consume in 1897 about 4,613,800 barrels of Portland Cement, and about 8,000,000 barrels of natural rock cement—a consumption nearly equal to that of Germany. In Germany the use of rock cement has practically ceased, as good Portland cement can be obtained at the works at $1.25 to $1.50 per barrel. In consequence of improved methods the cost of manufacturing in America is constantly diminishing, and if the present fierce competition continues, German prices may soon be reached; then the Portland cement will gradually take the place of the rock cement, and drive it out of the market, as it has done in England and Germany. The excellence of American natural rock cement, and the many ways in which it can be used advantageously, leads me to believe that it has obtained a firm foothold in the United States, which it will keep, regardless of the many predictions of the Portland cement adherents.—E. W. Derby in the Engineering Magazine for November.

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PRACTICAL STONE-CUTTING II



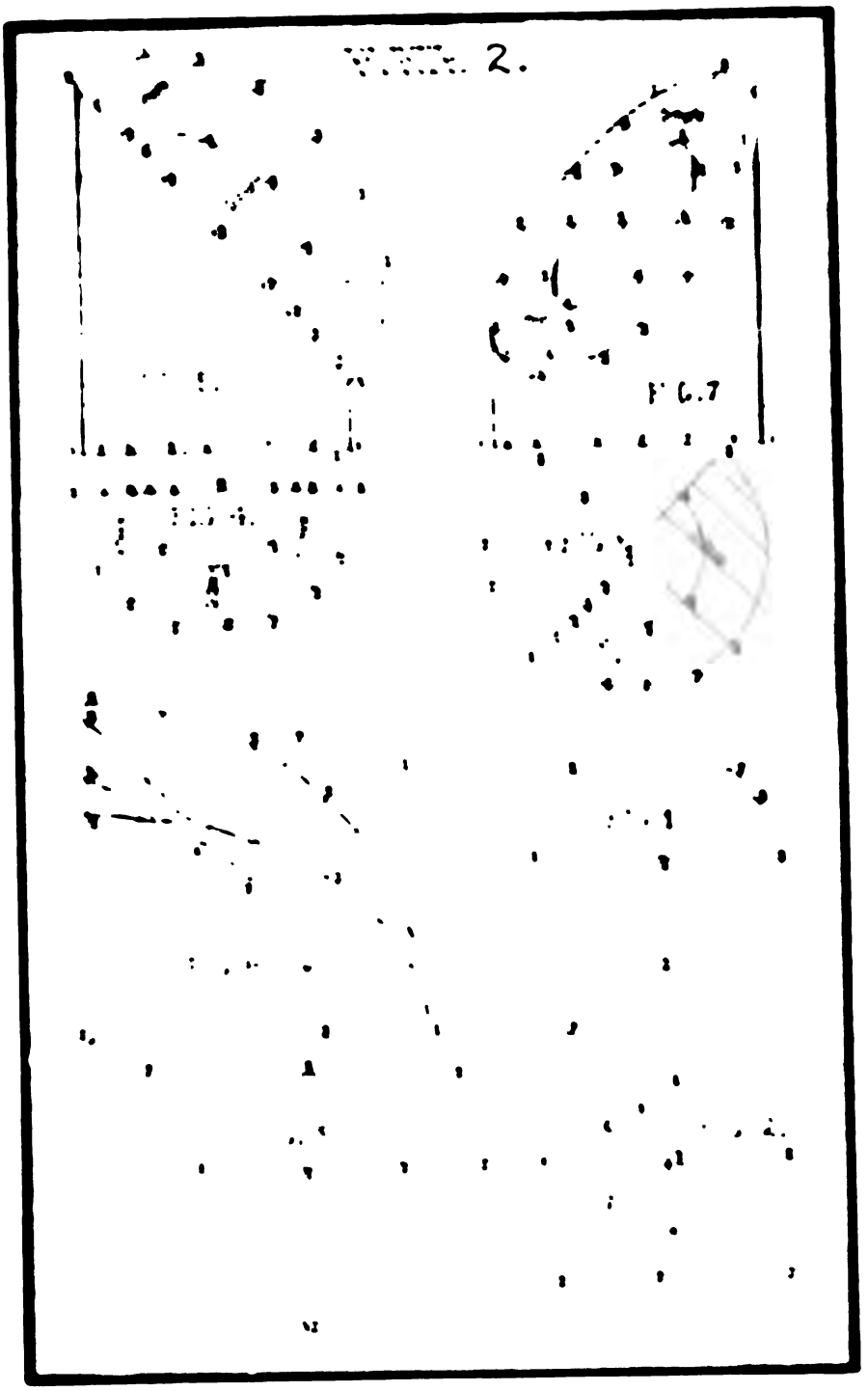
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coping, we assume the cylindrical surfaces in question to be cut or intersected with oblique planes in a manner similar to that shown in Figs. 4—7. The sections as found at the oblique planes, are those to be transferred to the Bed and Joint patterns. To develope the section: First at the plan, square with the diameter line A—O—B. From any number of points as C—D, etc., produce lines meeting the oblique line, as shown in the points A—C—D, etc. The lines 1′—C, etc., are termed Plan Ordinates, they are the horizontal traces of the auxiliary vertical planes, which intersect the surface of the oblique section plane in such a manner that the intersections D—D, C—C, etc., of Fig. 7, are at a parallel height from the horizontal plane of the plan. The "plan ordinates" are, therefore, the traces of lines which at the section plane, are said to be "level." Understanding this from the points C—D, etc., of Fig. 5, square with A—B, draw C—1′; D—2′, etc., make the length of these equal to that of the corresponding plan ordinates, and through the points obtained in A—1′—2′, etc., trace a curve, and the true form of the section may be obtained. In this construction the section is supposed to revolve around A—B as an axis, until the true section is brought to view. A—B is called the major, and E—O the semi-minor axis of the ellipse. The lines C—1′, D—2′, etc., are termed Ordinates of the Section Plane, and as shown in Fig. 7, which is a representation of the cylinder in a revolved position, they are, when resting in their proper position, parallel with the ground plane a′—e′. The method just explained by means of which the true form of section has been ascertained is termed "The Ordinate Method." It may also be noted the major axis A—B is the full inclination of the section plane, and the minor axis E—E has no inclination, and is at all times level when in position, and equals in length the diameter of the plan curves. Understanding clearly the principles of construction here developed, no difficulty will be experienced in apprehending the method of construction employed in developing these curves under the head of Bed and Joint sections.

A simple method by means of which the elliptical curves may be drawn when the lengths of the axis are known, is shown in Fig. 8. Let A—O and O—C be the given axis, with O as the center, and A—O, O—C, as radius, describe the curves C—B, and A—G. Either of these may now be divided into any number of parts (equal or unequal), and radius lines as O—3—H, etc., drawn. Then parallel with the major axis O—A draw 3—D, and parallel with the minor axis O—C, draw H—D, intersecting in D. This is one point through which the elliptical curve passes. In a similar manner may a number of points be found.

To draw a tangent to the curve of the ellipse at any point as D: At point 3, erect tangent 3—E. This intercepts the minor axis in E; joining this point with D the tangent may be projected. Or a tangent H—F, to the curve A—G,

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may be drawn at the point H, then joining F with D the tangent may be projected, and if produced will meet the minor axis in the point E, which proves its construction. To draw a normal, that is, a perpendicular to the curve at any point as D, square with the tangent D—F, through D; draw D—I, giving the line required. In a similar manner may "Tangents" and "Normals" be projected to any point desired. The normals are the proper inclination of joint lines as required at the face of an ordinary elliptical arch in a plane surface wall, and the method just explained (The Co-Ordinate Method) is far preferable to that usually employed, that of finding focuses for projecting them.

In Fig. 1 is shown the principal divisions of a circle. A—B is the diameter. A—C the radius, and C the center with which the curve may be drawn. The space comprised within A—D—B is a semi-circle; that within C—D—B a quadrant, and that within C—D′—B a sector The line joining E with F is called a chord, and the curve within E—F, F—D′, etc., arcs.

In Fig. 2 is shown the method of finding a tangent to any point as B on the curve of a circle. Draw the radius O—B produced; then with B as center and with any radius draw an arc as a—b; with same radius and a as center cut the arc in c; repeat with c as center cutting arc in d; then with d as center draw the arc e—c—B. Through the intersection e, produce a line C—B which is the tangent required. In Fig. 3 is shown a method by means of which the stretchout of a quadrant of a circle may be approximately ascertained. Square with the diameter draw C—O—E indefinitely; then parallel with the diameter draw F—E—D; with A B as radius, and B as the center, cut E—O produced in C, joining C with B produced gives in E—D the length, or stretchout of the arc E—B. Although an approximation it is near enough correct for all practical purposes.

Chartes H. Fox.

[TO BE CONTINUED.]

GOLD MINING BY QUARRY PROCESS.

MANY of the common metals are mined in various parts of the world by the quarry process, but in very few places are the precious metals found so situated that this method can be used. A correspondent of The Mineral Industry, writing from Alaska, states that there are two places in the United States where gold mines are worked as open quarries. One is on the Homestake property at Deadwood, S. D., and the other is on the Alaska-Treadwell, of Alaska. The correspondent describes the latter, calling the open pit a funnel, as follows:

"The larger axis of this funnel extends across at the surface somewhat over 1,000 feet; the shorter diameter is perhaps 500 feet. The point of the funnel is down about 300 feet. The whole area is open to the sky. Up

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worked in this fashion. At the Antioch they found a huge body of porphyry impregnated more or less with low grade gold ore, seldom exceeding $5 on an average to the ton. This was developed by a big open quarry, nearly 100 feet deep, 100 feet wide, and over 100 feet in length. As it was impossible to sort the ore, the quarry material was run from the mine direct by chutes into a large stamp mill and treated. Only by such development and treatment on a large scale was it for a time successful.

At Silver Cliff a horizontal body of rhyolite lava deeply stained with oxide of iron and manganese was found to carry near the surface more or less throughout its mass, very rich horn silver deposits. This plateau was forthwith worked over several acres by an open quarry from twenty to fifty feet deep, without any particular system or order until a zone was reached in which it is said the rich ore no longer continued. Some of the mines around Silver Creek are developed by an open cut like a railroad cut straight through a hill; others by an open crater-like pit seventy-five or more feet wide and as many deep.—Mines and Minerals.

[Regular Correspondence STONE.]

NOTES FROM ABERDEEN.

During the year now drawing to a close the stone industry in this district has been remarkably busy. It still continues good, only very slight snowfalls having yet been experienced which have not practically interfered with outdoor labor. The monumental trade benefitted by the Queen's Diamond Jubilee, but has been chiefly engaged on polished or ornamental granite fronts for buildings in other towns. This branch of business is certain to grow, and the recent great fire in London will, it is expected, bring a good few orders of the kind to Aberdeen. Apart from the engineering strike trade generally has been good in Aberdeen during 1897. The ship building industry at the port is expected to be busier next year than it has been since 1881. Conferences have been held this week as to the dispute in the joiner trade, but nothing is settled as yet. The boom in the building trade is still marked and the percentage of annual increase of population is larger in Aberdeen than in any other Scotch city.

The McEwan University Hall, Edinburgh, was opened last week. It has taken eight years to build, and has cost the donor, Mr. McEwan, M. P. for the Central Division of that city, £115,000, besides which government gave a grant of £8,000 toward cost of site. Altogether £400,000 has been spent on the Medical School and McEwan Hall of Edinburgh. The new hall is a semi-circular building, 106 feet in diameter, and is in the early Italian Renaissance style. The upper section of the outer wall is arcaded in red stone. There is a great steel dome, 130 feet to top of lantern. The hall is beautifully decorated, there is a splendid installation (17,920 candle power) of electric light, and the grand organ has 2,400 speaking pipes. Mr. Rowand Anderson, LL. D., etc., Edinburgh, is the architect.

Owing to threatened litigation by the salmon fishing proprietors the scheme as to sewerage outfalls into the river Dee has been modified. It has now been agreed to discharge the high level sewerage into the sea near Girdleness Lighthouse. This will be a serious undertaking for a comparatively small city like Aberdeen, as it will be necessary to cross the Dee by an iron syphon, and there will be a great amount of rock

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[illegible] THE MARKET IN CONNECTICUT

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Robinson's crowd a short distance from the quarry and proceeded to the place and camped for the night. This was Tuesday night. Wednesday morning Robinson's men appeared on the grounds. It appears that there were several squabbles of more or less importance prior to this, and that the matter was finally brought to a head and a clash was precipitated. A tape line had been stretched across the road, establishing a dead line. Some of Robinson's people attempted to cross it and the fight was on. The team carrying the force was backed off the line, when Robinson, riding at full tilt, was stopped by Mr. J. F. McMillan, who grabbed his horse's bridle, and was in consequence nearly ridden down. There was then a gun play, and Robinson's crowd retreated and went back to Aspen.

Warrnts were sworn out for McMillan and his men, charging them with assault with intent to kill. The men were promptly put under arrest and bail was quickly furnished. The arrest was said to be a ruse to get the McMillan men out of the way in order that Robinson's men might sooner jump the quarry. But they were foiled, as the arrested men sent up a new deputation, who took possession, and then held the fort.

An injunction was issued from the district court enjoining McMillan and his men from molesting Robinson in the location of his mineral claim, and the case will be settled in the courts. Robinson, in the meantime, is allowed to try and find his supposed silver mine.

The property over which all this trouble has arisen is a valuable one. In fact, it is said to be the only marble and granite quarry west of the Mississippi. The rock formation is of a peculiar kind, making it especially desirable for building and monumental purposes. The rock is polished with all the ease of a marble, and still possesses the durable qualities of the granite. The beds are of but recent discovery, having been found within the past two months. The tract covered is 160 acres. The ledge is 500 yards long, and there is a slab of the finest kind of rock exposed for 500 feet up the mountain side. A concern styling itself the Colorado Crystal Marble and Granite Company has taken hold of the deposits.

It is proposed, eventually, to erect extensive marble works in this city, and the product will be finished for the wholesale trade here. The head offices will likely be established here.—Colorado Springs, Colo., Telegraph.

ENGLAND IMPORTING GRANITE.

THE quarries of Cornwall and Devonshire can furnish an inexhaustible supply of granite of the best quality. England has no occasion to import that kind of building material unless it can be obtained more cheaply in that way than from her own immense and easily accessible deposits. But England is importing a large quantity of granite from Norway to be used in the dock yard extension works at Devenport.

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tion, and any Chicago firm taking advantage of another firm in this city to have their stock gotten out in shop or shops outside of Chicago not filling all these requirements will be severely dealt with by our union.

It is very desirable that you should understand this now when figuring on work, so that you will experience no loss, and every architect will notify you to that effect from the first day of the incoming year, 1898.

The Building Trades Council will furnish you with a label to be kept in readiness, so you will experience no delay or confusion.

Firms outside of the city will have to comply with the same regulations, or they will be debarred from all architects' offices in the city. PETER P. QUINN,

Business Agent Marble-Cutters' and Setters' Union, Chicago, Ill.

STONE-CUTTERS VOLUNTARILY REDUCE PRICES.

AN unusual action on the part of a labor organization comes to light in the announcement that the Journeyman Stone-cutters' Association, of Cincinnati, has voluntarily reduced its scale of prices from 45 cents to 25 cents an hour. This action has been brewing for some time, and was brought about by the recent cutting of prices by members of the union. It is said that a few firms helped the more conscientious members to keep up union prices, but that others engaged union men at less than scale prices, and thus gave undue advantage to those violating the scale. The result was a decision to reduce the scale, and thus give all a fair chance. A fight was made at the meeting to prevent the change, but it was passed. An effort was made to have President Monahan call a meeting to reconsider the question, but this had been anticipated by a voted-down motion to reconsider. It is said that the action will allow a number of shops to open, thus giving work, though at smaller compensation, to many stone-cutters who have been idle for nearly a year.

THE TRAP-ROCKISTS TRAPPED.

THE quarrymen who have been destroying the palisades of the Hudson river must now face the courts of New Jersey, and public sentiment seems to be so fully aroused that it is impossible to see how they can escape punishment for their acts of vandalism. Those who have examined the subject report that law is sufficiently strong to preserve the palisades, and the riparian commissioners, who have commenced the action against the quarrymen, say that the matter has passed out of their hands and into the hands of the attorney-general of the State. The action of the commission is welcomed by every lover of Nature, but it is action which has been forced by the awakening of public opinion. The commissioners have known for years that one firm at least has been working upon State land, and until compelled to do so, it took no action to prevent this. It is now believed that the courts will exert their power to preserve what is left of the grandeur of the palisades, which have become so familiar to every person who has sailed upon the historic Hudson river.

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ARCH OF THE STATES



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AGITATING FOR AN ALL GRANITE BUILDING.

THERE is now no question that at the January meeting of the board of supervisors an effort will be made to change the contracts for the county building so as to substitute granite for sandstone in the superstructure, says the Detroit News. A majority of the board is declared to be in favor of the change, being persuaded thereto, it is said, by an agent of the granite men, who has been quietly working up sentiment for a couple of months past.

Should the plans already adopted be carried out without change," says Contractor Robertson, "there is no doubt that the county will have a building, of which it need not be ashamed. It will be ample to accommodate all the needs of the county for generations, and it will be handsome in design and perfect in detail.

"Of course, there is no question that to rear the superstructure of granite would be a big gain from the standpoint of beauty. Granite is to sandstone what sealskin is to plush, and the relative costs are the same."

"But what about the contract already made with the Berea sandstone people?" Mr. Robertson was asked.

"That would certainly have to be taken into consideration," he replied. "The contract involves a total expenditure of $52,000, which includes the cost of shipping. The Berea people couldn't be expected to release us from this contract entirely without cost, and I feel confident that it would take from $15,000 to $20,000 to buy them off.

"The people who are anxious to see the building completed would find some objection," said Mr. Robertson. "Under ordinary circumstances the building will be completed on time, or by Jan. 1, 1899. Should the change be made it will make a further delay of at least six months or so. The delay may be longer. It will certainly be no less.

"It hasn't been figured out in detail yet, but it is safe to estimate that the additional cost, including the amount that would have to be paid for releasing the sandstone contract, would reach as high as $265,000. I might go higher.

"Of course," Mr. Robertson concluded, "the county is the judge. The building as planned will make an entirely satisfactory one, and there is no reason for changing, except that to build it all of granite would make it more luxurious in appearance."

"It's rather strange that the board did not consider these things when it decided upon sandstone in the first place," said a supervisor who is opposed to the change. "In my estimation it will be ridiculous for the county to make a shift now. Suppose that in January we decide to adopt granite and make arrangements to that end. Then a big kick against the additional cost comes from the taxpayers; what's to prevent the new board which

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OUR FOREIGN TRADE IN STONES, ETC.

From the monthly summary of finance and commerce of the United States, corrected to December 4, 1897, we compile the following:

ARTICLES.	OCTOBER.				10 MONTHS ENDING OCTOBER—			
	1896		1897		1896		1897	
Imports—	Quan.	Values.	Quan.	Values.	Quan.	Values.	Quan.	Values.
Cement (lbs.):		*Dollars*		*Dollars*		*Dollars*		*Dollars.*
Imp. from—								
United Kingdom	34,040,407	109,927	16,344,20	54,689	222,523,754	711,018	109,931,143	359,123
Belgium	25,773,789	71,074	28,727,366	87,739	250,056,795	725,855	174,5 2,179	512,321
France	983,668	3,257	761,297	2,586	11,341,6 0	33,209	14,337,575	42,088
Germany	40,898,920	134,940	36,281,398	120,323	431,951,914	1,42 ,259	389,216 921	1,282,0 6
Other Europe	2,118,711	7,264	1,388,900	4,484	20,702,287	72,515	14,787,800	53,037
British North America	300,800	1,310	172,575	846	3,806,750	16 272	1,517,97	7,234
Other countries					1,221,600	..852	411	1
Total	104,416,295	327,802	83,675,736	270,547	941,604,700	2,987,880	704 364,003	2,255,810
Marble, and mfrs. of		75,130		35,409		716,776		740,617
Stone, & manufactures of, including slate		31,428		26,373		837,868		224 339
Total		106.558		61,782		1,054,644		964 9 6
Exports—								
Marble and stone, and manufactures of:								
Unmanufactured		3,388		10,614		58,043		72,891
Manufactures of—								
Roofing slate		41,500		118,22:		374,548		967,253
All other		58,870		29,575		486,551		377,270
Total		104,258		158,416		919,132		1,417,414
Cement bbls	3,892	7,547	6,371	9,496	48,290	75,682	47,180	84,663
Exports foreign mdse.								
Cement, Rom., Portland & other hydraulic lbs	698,411	2,530	386,270	1,294	3,962,990	14,889	1,509,055	6,150
Marble, & mfrs. of		1,678		60		2,903		3,5 3
Stone, & mfrs of including slate		863		144		8,617		10 615
Total		2.541		204		11,580		14,168

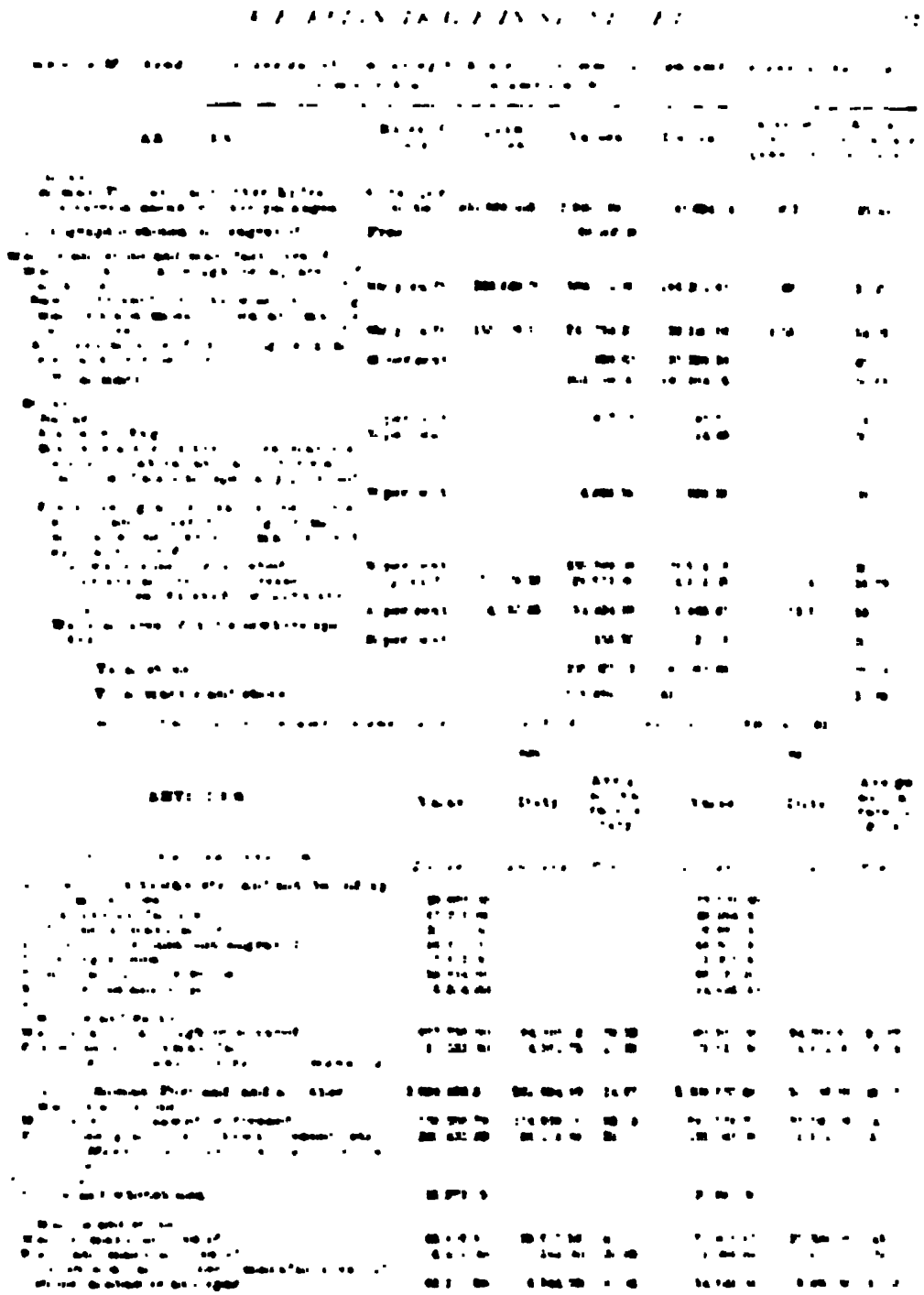
Merchandise Remaining in Warehouse on October 31, 1896, and October 31, 1897, Respectively.

ARTICLES.	October			
	1896		1897	
	Quantities.	Values.	Quantities.	Values.
Cement, Roman, Portland, etc. lbs.	15,903,026	$ 46 806	6,759 284	$ 20,692
Marble and stone, and manufactures of:				
Marble, and manufactures of		33,910		19,916
Stone, and manufactures of, including slate		773		1,949
Total		34.713		21,865

Imports for Consumption.

Articles and Years.	Values.	Duties.
Marble and stone, and manufactures of (dutiable) Ending June 30—		
1884	950,216.79	419,658.32
1885	874,5 7.54	366,537.42
1886	89d,194.47	368,957.70
1887	96 ,981.64	381,405 48
1888	976,622.56	372,569.68
1889	1,005,484 34	380,879 52
1890	1,313,056.11	469 223.78
1891	1,376,532.32	572,844.05
1892	1,401,349.29	609,226,61
1893	1,750,498 97	723,349.13
1894	1,152,864.96	514,856,88
1895	1,255,001.26	427,764.32
1896	1,347,484.44	447,212.23
1897	1,228,486.23	431,027.73

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STATUE WITH A WARDROBE.

ONE of the most curious things in Brussels, a thing that must be characteristic to some extent of the temper of the people, is the little manikin statue and fountain. It is a statue of a naked boy, said to have been erected by a nobleman whose lost son was found on this spot. But there is not the least excuse for the boy's nakedness, for he is well supplied with clothing of many sorts, and is rich enough to buy more suits occasionally. Louis XV. decorated the statue with the Order of the Holy Ghost, possibly at a moment when another sort of spirit had possession of him, and it is the owner of nine handsome costumes belonging to different periods. On fete days the boy is gorgeously clad; sometimes in old French costumes; sometimes in the uniform of the Guard Civique. All this is funny enough, but not as curious as the rest. It is the fashion for wealthy maiden ladies of Brussels to fall in love with the statue, and remember it handsomely in their wills. Through one such bequest this petted boy is provided with a valet at a salary of $40, and a short time ago another unwedded admirer left $200 for the completion and maintenance of his wardrobe.—Kansas City Journal.

THE CONNECTICUT BROWNSTONE BUSINESS.

THE stone business by water has closed for the season, which has been a fairly brisk one, says the Middletown (Conn.) Press. There has been hardly a day but what a vessel of some description has been at the docks taking a consignment of stone, mostly to New York. Hundreds of tons of wall stone have been shipped to Hartford for building purposes. As the marine editor of the New London Day said some few days ago, the fleet of schooners in the quarrying trade, which used to sail from Portland is rapidly diminishing, scows and barges doing the work. Years ago it was predicted that steamers would ultimately take the place of the schooners, but from present indications this will never occur, as the present means of conveying stone is not so expensive. All the quarry vessels will be hauled out at New London and New York, to undergo repairs previous to continuing in the business another year.

A PECULIAR STRIKE.

A STRIKE of marble cutters was called for a peculiar reason at Chicago, recently, and in less than two hours contractor Jacob Schureman made a settlement and the men returned to work. The contractor employed James Houlihan, but each day he appeared for work Houlihan was told he would not be needed until the next day. The last time Houlihan was informed he could not be given employment at all, and then business agent Quinn called a strike to force the contractor to pay for the time lost by Houlihan. In a short time the contractor acceded to the demand.

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TIMELY TOPICS

Contesting for Supremacy The transfer of valuable quarry property to a railroad interest [illegible] railway company, was the most important event in the stone industry during the new year. It is the result of the railway company's desire to control the stone trade from the point of view of a shipper. It is incidentally to block the [illegible] operations in the [illegible] and to [illegible] the stone [illegible] between these places for [illegible] the [illegible] to [illegible] and [illegible] that is the [illegible] stone [illegible] far [illegible] [illegible] quarries [illegible] the [illegible] [illegible] [illegible]

roadway in the county is a constant customer for it. A crusher is no longer a novelty, and therefore an expensive implement. Manufacturers of them can now fit out a plant of any size at very reasonable figures. The demand for crushed stone for road building is increasing enormously in every quarter. Dirt and gravel roads are tabooed by everybody in the rural districts, and the dwellers in cities set up a constant howl for macadam or asphalt. All this suggests a good opening of a paying side line for the quarryman.

A Pathetic Matter. Who says there is not pathos as well as poetry in cold, cold tombstone literature! Hearken to the mellifluous puffing of a monument dealer by a Boonville scribe:

> Can storid urn, or animated bust,
> Back to its mansion call the fleeting breath?
> Can honor's voice provoke the silent dust,
> Or flatt'ry soothe the dull cold ear of death?

While we do not feel that the affirmative answer can be given to these questions, we do feel a melancholy pleasure in doing what we may to pay a last sad tribute to the departed dear one's worth.

It is not to be expected that a country editor could answer Poet Gray's mournful "questions," but it must surely be "a melancholy pleasure" to him to steal a stanza from the immortal Elegy to "pay a last sad tribute." But he gets in his work as an original versifier further along. He says:

> How beautiful appears the cemetery where above the grave in silent imitation of the bereft friends, lifeless statues keep unconsciously their watch, and seem to weep. One of the most handsome and well-selected stocks of American and imported granite can be found here.
>
> When we leave this world of sorrow and of care,
> To meet with loved ones over there;
> If you wish to meet on the beautiful shore,
> Get your monuments of R. L. Moore.

Consider the "silent imitations of bereft friends" in a country graveyard—the recumbent lambs, the solemn doves, the shapeless angels! He's mistaken. It is not the "lifeless statues" that "seem to weep," but the living beholders who actually shed water when they come near them. And then the poetical wind-up! That would make a lifeless statue weep.

The Granite Cutters' Demands. The Granite Cutters' National Union has decided that "On and after the year 1900 the hours of labor shall not exceed eight per day for members of our union, and all agreements must be framed accordingly; this not to be construed to interfere with existing eight-hour agreements or to prevent branches from establishing the eight-hour-day previous to that year, if conditions are favorable; all bills of prices taking effect at that date shall be established on the basis of not less than three dollars ($3) per day."

Will it stand? It won't be the fault of employers if it doesn't—certainly not of employers outside of New England. If it be strictly enforced it is likely to be a good thing for the granite industry in the South and West, and conversely to the industry in New England—for, bear in mind, there is abundance of excellent granite in many states far away from that section, and nearer the centers of building operations. The rate of wages paid for manufacturing granite in New England has had very much to do with its selection for public buildings in the Middle West especially. A prominent Western granite quarryman said to us recently that the wage rate of his granite quarriers and cutters was all that stood in the way of his bids winning over those of the New England bidder. He instanced the loss of one $100,000 job because he could not compete and pay

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SELECTED MISCELLANY.

WREN AND FREEMASONRY.

ACCORDING to Lessing, the English word masonry should be masony, for it is derived from the Anglo-Saxon word massoney, a secret commensal society; which last word again comes from mase, a table. Such table societies and compotuses were very common among our forefathers, especially among the princes and knights of the Middle Ages; the weightiest affairs were there transacted, and peculiar buildings were appropriated to their use. In particular, the masonies of the Knights Templars were highly celebrated in the thirteenth century. One of them was still subsisting in London at the end of the seventeenth century, at which period, according to Lessing, the public history of the Freemasons first commences. This society had its house of meeting near St. Paul's Cathedral, which was then rebuilding. Sir Christopher Wren, the architect, was one of its members. For thirty years, during the rebuilding of the cathedral, he continued to frequent it. From this circumstance the people who had forgotten the true meaning of the word massoney took it for a society of architects with whom Sir Christopher consulted on any difficulties which arose in the progress of the work. This mistake Wren turned to account. He had formerly assisted in planning a society which should make speculative truths more useful for purposes of common life. The very converse of this idea occurred to him, viz, the idea of a society which should raise itself from the praxis of civil life to speculation. "In the former," thought he, "would be examined all that was useful among the true; in this all that is true among the useful. How if I should make some principles of the masony exoteric? How if I should disguise that which cannot be made exoteric under the hieroglyphics and symbols of masonry, as the people pronounce the word, and extend this masonry into a Freemasonry in which all may take a share?" In this way, according to Lessing, did Wren scheme; and in this way did Freemasonry arise. Afterwards, however, from a conversation which he had with Nicolai, it appears that Lessing had thus far changed his opinion (as given in the "Ernst und Falk"), that he no longer supposed Sir Christopher simply to have modified a massoney or society of Knights Templars, which had subsisted secretly for many centuries, and to have translated their doctrines into an exoteric shape, but rather to have himself first established such a massoney, upon some basis of analogy with the elder massoney.—The Architect.

THE FAMOUS PIPESTONE QUARRIES OF SOUTH DAKOTA.

SITUATED at the extreme limit of the eastern boundary of South Dakota are the famous red pipestone quarries, for whose existence scientists seem to be at a loss for an explanation. This is the only quarry of the kind known to exist on the American continent, or for that matter, in the world. The stone is that from which the Indians make their pipes and ornaments, and for which the Indians make annual pilgrimages now, as they have done in ages past.

In the neighborhood of this quarry a tribe of Indians located years ago and became zealous converts to the Episcopal faith. Recently Bishop Hare visited their community and, among other things, was called upon to consecrate an altar, perhaps the most unique that was ever erected in a chapel. The material used was almost wholly red pipestone, taken from the quarries by the Indians and finished and polished by them. The substance used for polishing was honey, and the work was slow and laborious

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THE COLONIAL SCHOOL

words, accuracy was obtained. The roar of the many voices of the large school, all pitched in different keys, could be heard on summer days for a long distance. * * * In olden times only one kind of a pen was used—that cut from a goose-quill with the feathers left on the handle. The selection and manufacture of these goose-quill pens was a matter of considerable care in the beginning, and of constant watchfulness and "mending" till the pen was worn out. One of the indispensable qualities of a colonial schoolmaster was that he be a good pen-maker and pen-mender.

Ink was not bought in convenient liquid form as at present; each family, each person, was an ink manufacturer for his own individual consumption. The favorite method of ink making was through the purchase and dissolving of ink-powder. In remote districts of Vermont, Maine and Massachusetts home-made ink, feeble and pale, was made by steeping the bark of swamp maple in water, boiling the decoction till thick, and diluting it with copperas. * * *

Next to penmanship, the colonial school and schoolmaster took firm stand on "cyphering." "The Bible and figgers is what I want my boys to know," said one old farmer. I have examined with care a Wingate's Arithmetic which was used for over a century in the Winslow family in Massachusetts. The first edition was printed in 1620. It is certainly bewildering to a modern reader. "Pythagoras his Table," is, of course, our multiplication table. Then comes "The Rule of Three," "The Double Golden Rule," "The Rule of Fellowship," "The Rule of False," etc , etc., ending with "a collection of pleasant and polite Questions to exercise all the parts of Vulgar Arithmetick."

Wingate's Arithmetic and Hodder's Arithmetic were succeeded by Pike's Arithmetic. This had 363 rules to be committed to memory —and not an explanation was given of one of them! It is the most barren school-book I have ever read. These printed arithmetics were not in common use. Nearly all teachers had manuscript "sum-books," from which the scholars copied page after page of "sums," too often without any explanation of the process, though there were also many and long rules, which helped the penmanship if they did not the mathematics. * * * The logs for the great fireplace, furnished by the parents of the scholars, were a part of the school expenses; and in many a school when a parent was tardy in the delivery of his winter's load of wood the child suffered by banishment to the farthest and coldest corner of the schoolroom.

The teacher's pay was in any of the inconvenient and uncertain exchanges of the day: wampum, beaver skins, Indian corn, wheat, peas, beans or any country product known as truck. Whale oil and fish were paid to the teachers of Cape Cod. It is told of a Salem school that one scholar was always placed in the wiudow to study and also to hail occasional passers-by and endeavor to sell to them the accumulation of vegetables, etc., which had been paid to the teacher.—From "Schools and Education in the American Colonies," by Alice Morse Earle, in The Chautauquan for January.

RIVER BED A QUARRY.

THE Milwaukee river and the surrounding territory in the mile or so occupied by the Milwaukee Cement Company is picturesque or rough and unsightly—just as one is inclined to look at it.

One of the most interesting things that has been done at the cement works is the changing of the course of the Milwaukee river for a distance of over half a mile. To the east of the old course of the river the rock was taken out and the quarries worked as far as they would pay. Then it was concluded that immediately west of the river was a fine bed of rock which could be worked to advantage if the river were out of the way. So a dam was built about three-quarters of a mile below the Washington bridge and the river narrowed down to about half its former size.

Then the water was sent through the worked-out quarries to the east of its original course An embankment was raised between the old and new courses and now the old river bed is perfectly dry. This change was made half a dozen years ago. Quarrying was commenced at the southern end of the dried-up bed and the stone has been taken out for a distance of about an eighth of a mile, and to a considerable depth. Around the sides of this big hole the strata of rock can be seen, rising one above another like layers of building stone in a wall. A steam drill and explosives are used to loosen the rock and it is carried away to the mills on small

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For men trained under such auspices no task is too difficult, no risk is too great, no amalgamation of interests is too large; while the British kings of industry, "cabined, cribbed, confined" on small island, opposed on every side by hostile tarriffs, hampered by the conditionf of former successes achieved through caution, accustomed to work on the orders of mildness instead of seeking markets direct, have, in their turn, been molded so that they have come to prefer security to enterprise, steady returns to enormous risks, personal supervision to corporate management of combined interests on a vast scale. Such is the contrast, though it is not altogether as one-sided as it seems. If the American watchword is "audacity," the British watchword is "stability." If the American is dependent on prosperous times to make a fortune, the Briton is equal to meeting prolonged bad times without losing one- Thhe product of the velocity os the one and the mass of the other would be a momentum strong enough to transform the world.—Cassier's Magazine for January.

COLORADO'S STONE SUPPLY.

THERE is not a state in the Union that possesses a greater wealth of building material than Colorado. Stone of all descriptions for exteriors and the finest of marble and onyx for interier finishing are found here as well as superior clays from which are manufactured the finest pressed brick, virtified sewer pipe and fire proofing materials.

No better example of the best class of granite work can be found anywhere than the Gunnison Company's gray granite. used in our state capitol, while the pink variety on the lower stories of the Equitable, Croper and McMutrie and other business blocks from the Platte canon quarries is of equal excellence and gives an appearance, as well as a reality, of solid base to the towering brick structures, and affords also a pleasing and harmonious contrast of color.

There are other sections of the state in which granite is plentiful. The Cotopaxi quarries in Fremont county supply a light gray of good quality and railroads pass through several districts where quarries could be opened if there was a sufficient demand and favorable freight rates.

Sandstone of good quality is found in almost every county, although the quarries from which the building demand is supplied are those of Manitou, and the stone is of a light red variety used in the Boston and Essex blocks, the Central Presbyterian church and other public and private buildings. The Pleasant Valley quarries near Fort Collins and those in the Frying Pan district, near Glenwood Springs, are also marked.

In flagging and dimension stone Colorada may challenge the world. The stones can be quarried in almost any size, have a smooth natural face and range in thickness from two inches to as many feet. In hardness they almost equal granite. For siedwalks and foundations for heavy structures Colorado can both beat and supply the world.

Of the gray or yellow sandstones for superstructuses and dressings the product of the Coal Creek quarries has gone for. White sandstoue is quarried in Gunnison county.

There are several counties in which extensive marble deposits exist. In Yule Creek district, Gunnison county, several white marble quarries have been opened in late years and the tiling of the capitol comes from them. It is declared equal to the best Italian, although being taken from shallow depth. When suitable transportation facilities are provided this stone should find a ready market in the East and a time may come ween the millions spent in importing marbles will be diverted to Colorado.

The Beulah quarries in Fremont county also furnish a superior grade of colored marbles and a recent discovery in Conundrum gulch, near Aspen, is at present interesting capitalists. Onyx is being mined in Routt county. —Denver Republican.

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a big stone which suddenly started although no one was at work upon it. Mr. Dyer was pinned between two rocks and so seriously injured that it was necessary to amputate his left leg.

Brownville, Me.—As William Roberts, a slate splitter, was assisting a fellow workman to break up a mass of slate a fragment flew and struck him, embedding itself in the ball of the right eye.

Patrick McCormick, an employe in a quarry at Mt. Desert, Me., was severely injured by the premature explosion of a blast. The blast is what is known among quarrymen as a "seam" blast and when it went off McCormick received the greater part of the powder in his face.

Gloucester, Mass.—John H. Borkstrum, foreman of a gang of men employed at the Pigeon Hill granite quarry, was instantly killed. The men under him had been engaged in hoisting a block of stone weighing three tons from a pit when the tackle on the fall block parted, and the big stone swung around, striking Borkstrum a terrible blow on the head. The blow lifted him from his feet and he fell into a pit 100 feet deep. In the fall upon the jagged rock below the body was badly cut and mangled.

York, Pa.—David Roberts, Sr., and his son Arthur, working in a quarry, filled a crevice in the slate rock with powder and exploded it to throw down a ledge. The blast failed to do the work, and the men taking about a half keg of powder and some steel wedges went to the place, and setting the powder nearby, went to driving the wedges to open the crevice more before refilling with powder. While doing so a quantity of powder that for some cause had not exploded before, ignited, puffed out from the crevice in a volume of flame severely burning both the men. Instantly the half keg of powder also ignited and exploded with great force. The elder Roberts was thrown violently prostrate. The son, less fortunate, was thrown over twenty-feet down from the ledge, but alighted on his feet on a pile of rubbish and escaped with severe bruises in addition to the burns at first received.

York, Pa.—D. V. Doyle, a stonecutter, while returning from Adamsville, had his leg broken in a very peculiar manner. He was driving a two-horse wagon. The tongue in some manner broke and the wagon struck the horses. They immediately began kicking and endeavored to run away. One of them kicked over the dashboard and struck Mr. Doyle on the leg. The horses then ran into a fence and were stopped.

Montpelier, Vt.—Thomas Eagan, president of the Capital Granite Company, met with a very painful and serious accident while he was superintending the removal of a door, 36 feet wide, and was standing on a large wheel, which runs on its side, about 10 feet from the ground. He ordered the man who had charge of the derrick to move it about five feet forward, not thinking where he was standing, and when the engine started his foot slipped and went between the spokes, twisting his leg around. He fell backward, and struck his head on a bolt, cutting a gash about three inches long, on the back of his head. If the derrick had given another turn he would have been thrown to the ground and would undoubtedly have been killed.

Granville, N. Y.—Richard Lewis, aged 53 years, an employee of the Boston company, was at work in the quarry and was standing on a shelf, secured by a rope, midway from the bottom, and with an iron bar loosened a large block, when a mass of rock from above came down upon him and he was carried with the debris to the bottom of the quarry. Upon examination it was found Mr. Lewis sustained several cuts and bruises on different parts of the body and the right leg below the knee was badly crushed. Mr. Lewis has been seriously injured several times before.

While engaged in drilling out a charge for a blast which failed to explode in a quarry at Phœnicia, N. Y., Thomas Jones and his son, Spencer, were seriously injured. Thomas was hurled several feet and was severely bruised and blackened by the powder. Spencer's arm was nearly blown off, one eye was blown out, and he was otherwise terribly injured.

Lancaster, Pa.—Wm. Westman, who operated stone quarries a mile west of Lancaster, came to town and in the evening started to walk to his home. He was said to have been in an intoxicated condition, and when near his home sat down on the track of the Pennsylvania railroad and fell asleep. He was struck by a shifter, sustaining injuries from which he died during the night.

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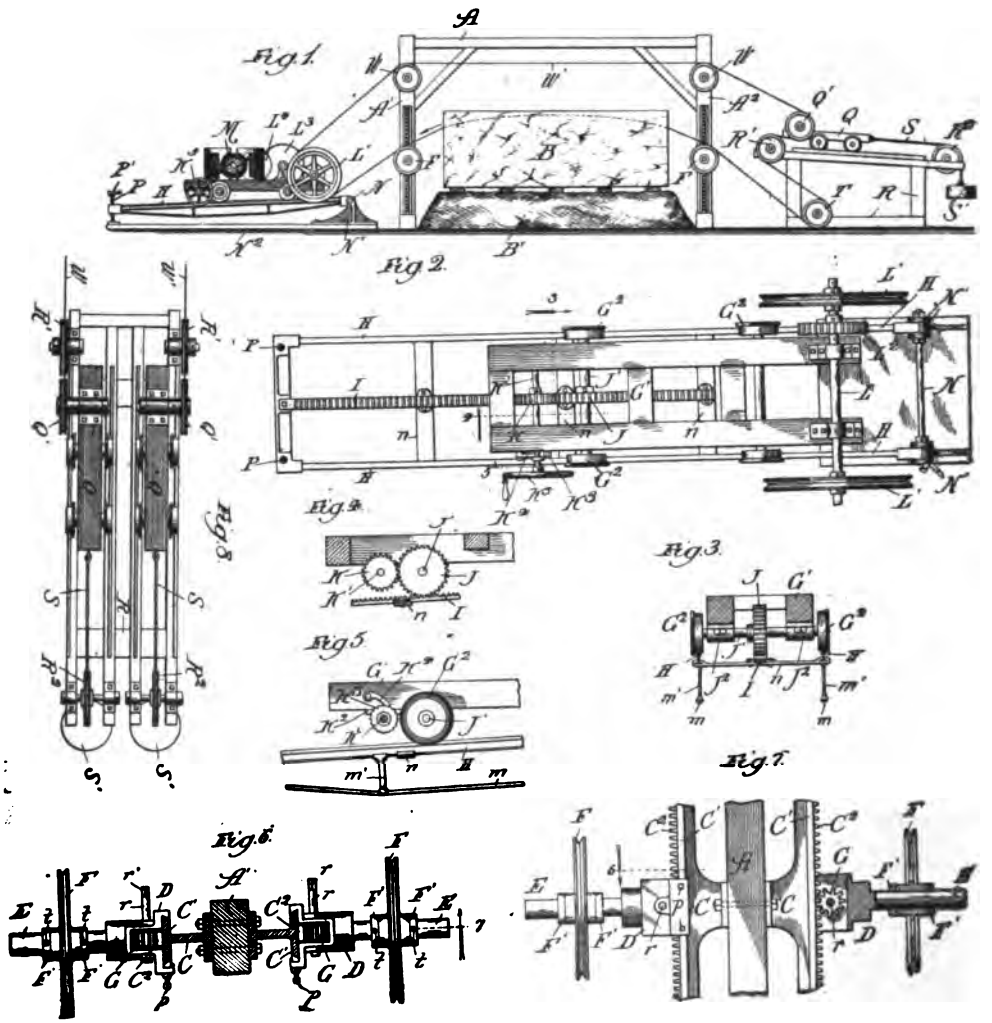
RECENT PATENTS.

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under any sudden strain, thus preventing jumping. This is of the highest importance as contributing to the smooth and efficient operation of the machine.

It will be understood that while the double tensioning device probably gives a better result because of producing a more equal tension throughout the cable than the single tensioning device does and in some instances is rendered particularly desirable because of the reasons given above, yet the supplementary tensioning device is by no means indispensable, and it may be replaced by sheaves mounted simply in a stationary or adjustable pillow-block, which would be equivalent to dispensing with all of the supplementary tensioning devices except the sheaves T and their supports.

The feature involving driving-pulleys journaled in a truck mounted upon an inclined track is one of great importance in the production of a practical portable machine. These machines as constructed for the ordinary trade are not usually very large, and they are usually provided with but one cutting-cable. In this case the supplementary tensioning device may readily be dispensed with. In the larger and



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...NCHING AND CRANDALL-ING MACHINE

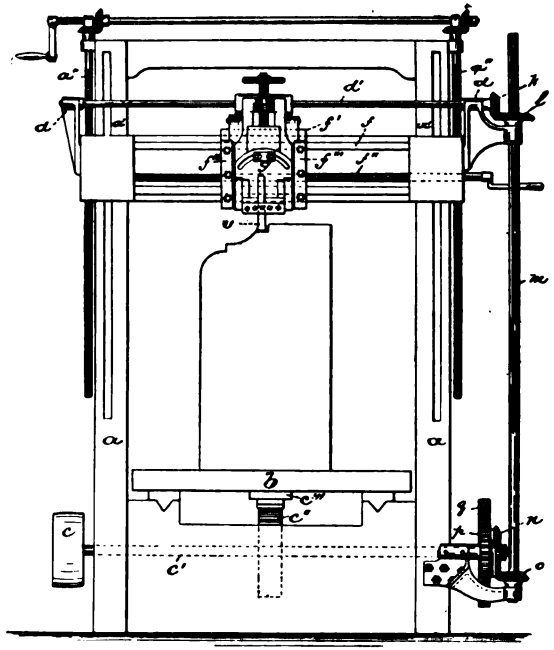


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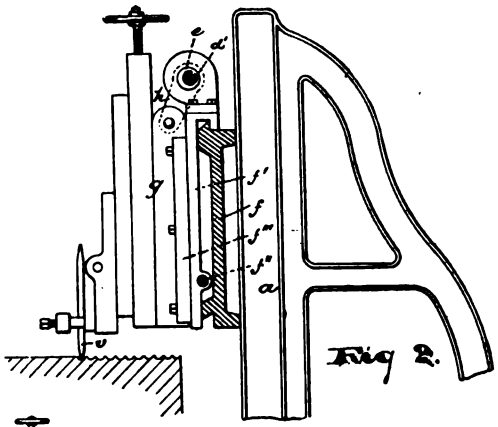


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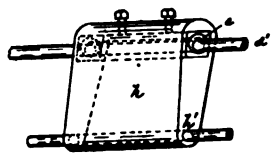


Fig. 5.

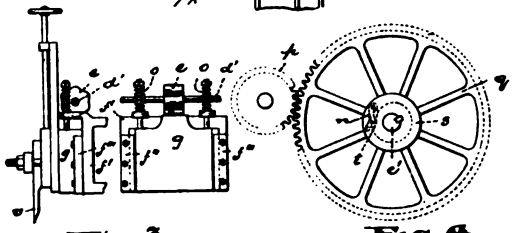


Fig. 3.

Fig. 4.

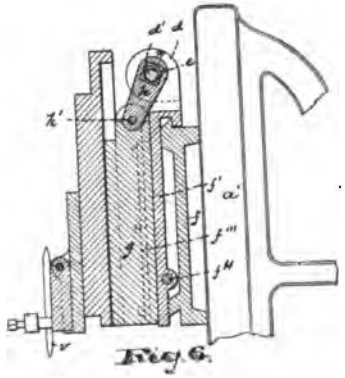


Fig. 6.

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MACHINERY AND SUPPLIES.

[Matter appearing under this head is compiled and edited from data furnished by the advertiser, and should not be accepted as the opinion of the publishers.]

A NEW SOUTHERN AGENCY.

WE note that the southern agency of the Lidgerwood Manufacturing Company, New York, builders of the Lidgerwood hoisting engines, cableways and conveying devices for contractors and others, has been placed with the firm of Woodward, Wight & Co., Ltd., New Orleans, La. With this connection and Mr. J. H. Dickinson as their engineer in charge of all specifications and orders, the Lidgerwood company insures to its customers good service from an engineering standpoint and the prompt and satisfactory filling of all orders entrusted to its care.

JOSEPH DIXON CRUCIBLE COMPANY, JERSEY CITY, N. J.

Mr. John A. Walker, vice-president of the above company, writes of the outlook for business this year as follows:

"In 1893 it was a case of business paralysis, in 1894 we had a year of debility, in 1895 the patient partially revived, in 1896 came a relapse, but in 1897 came recovery and the patient took up his bed and walked. The great medicine man was dollar wheat and thirty cent corn, plus poor harvests at this exigency abroad.

"I saw it myself, for in November I visited Indianapolis, Cincinnati, Chicago, Omaha, Denver, Kansas City, Pueblo and St. Louis, and saw everyone up to his eyes in new business. The consumer at last had money once more, and was spending it.

"The industrial triumphs of 1897 are important. In this year the business cloud passed away and another era of prosperity, hopefully of long duration, opened. Export trade was larger in the fruits of the harvest, and particularly in manufactured goods, than in the history of the country. Americans are competing in every market. American motors won the order in London. On a bridge in Holland an American firm was the lowest bidder. American steel rails go regularly to China, Japan and India. A movement is on foot to have the English Parliament pass a law changing the stamp on goods not made in England, stamped "Abroad" instead of the name of the country where they are made. This is an effort on the part of the English law-makers to obscure the origin of these goods.

"For the Dixon Company personally, we have shared in the general prosperity. The year has been an agreeable one, the future looks rosy to those who have eyes to see. Perhaps the outlook was never more inviting. Never were there so many roads open to wealth to those who know how to find them."

THE BIELHEN FOUNDRY AND MACHINE COMPANY,

of St. Joseph, Mo., write under recent date that they are just completing the erection of the third saw gang for W. WcMillan & Son, of Chicago, put up in 1897. They were then making ready for shipment three gangs to R. Robertson & Co., Detroit, Mich., who have the contract for the stone and granite work of the new Wayne county court-house. They are also building a gang for the Butler-Ryan Company, of St. Paul, who have the contract for the new Minnesota capitol. Western stone-sawing machinery is making a record, and the Bielhen gang is becoming famous the world over.

CLEMENT GIVES BOND.

J. F. Clement, of Philadelphia, reports that he has given bond to C. P. Gill & Co., of Montpelier, Vt., protecting them against all damages in the suit brought by the American Pneumatic Tool Company and James S. McCoy, for infringement by the use of the *old-style Clement valve tool*. This suit has no bearing whatever on the *new Clement valveless tool*,

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VICTORY FOR THE BOYER HAMMER.

To the Trade:

We are pleased to state that on January 7th the United States Circuit Court of Appeals, at New York, in the infringement suit brought by The American Pneumatic Tool Company against the Bigelow Company, of New Haven, Conn., for using the Boyer Hammer, decided in favor of the defendant, and reversed the decision of the lower court, thus confirming the position we have always taken, and the assurances which we have given the trade, that the Boyer Hammer did not infringe the patents of the American company, and furnishing a complete answer to the threats and misrepresentations which that company have been making with respect to the Boyer Hammers.

In addition to our regular Boyer Hammers, which are familiar to the trade and have acquired such a high reputation, we are now prepared to furnish a still further



improved style of hammer, which we have designated The New Boyer. The valve mechanism of this new hammer is entirely different from the old, and is designed to accommodate an increased length of piston chamber and an increased length of piston stroke, and consequently materially increase the force of the blows of the piston in a tool of given size, without increasing the length of the tool as a whole. It also reduces the vibration of the hammer to practically nothing, so that in both of the above respects the new hammer is superior to the old. We are prepared to furnish either style. ALL TOOLS SENT ON TEN DAYS' TRIAL, SUBJECT TO APPROVAL, AND GUARANTEED FOR ONE YEAR AGAINST REPAIRS. Our new catalogue is in the hands of the printer, and is now ready for distribution. We desire to have all stone-workers possess a copy of it. Furnished free on request.

CHICAGO PNEUMATIC TOOL CO.,

635 Monadnock Building, Chicago, Ill.

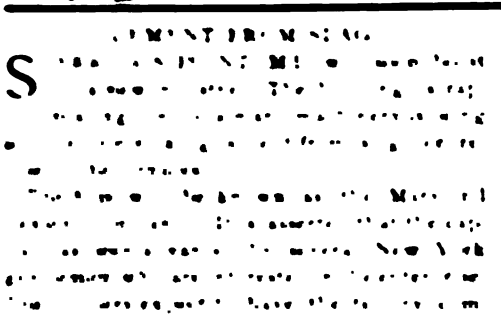
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THOMAS CARLIN'S SONS.

Allegheny Pa.

Manufacturers of Hoisting Engines, Derricks of Steel or Wood, Contractor's Tools and Machinery.



FRONTIER IRON WORKS DETROIT, MICH.

HIGH & IMPROVED

Gasoline and

GAS ENGINES



SECOND-HAND PLANERS

Especially Adapted for Stone.



Prentiss Tool and Supply Co.

115 Liberty St., NEW YORK.



McKIERNAN DRILL CO.

120 Liberty Street, New York.

Manufacturers of

Rock Drills

Also Manufacturers of Steam Pumps, Steam Hoisting Engines, Steam Shovels, Dredges, Pile Drivers, Steam Engines, Boilers, Tunnel Cars, Rails, Frogs, Switches, Turntables, Locomotive Cranes, Contractors' Outfits, Mining Machinery, Steel Cars, Wrecking Cars, Tools and Supplies.

Air Compressors and **Quarrying Machinery.**

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BOOKS AND PERIODICALS.

From the office of an American trade journal issued the old year's peerless product in the Art Preservative of All Arts, in the form of the Holiday Number of the Northwestern Miller, of Minneapolis. It does not excite surprise or wonderment to observe progressive excellence in that which emanates from well equipped and skillfully directed establishments for the production of special work of any kind, but when the finest thing in typography, for instance, is the creation, not of the master printer of his time but of a modest editor who has withal the exquisite sense of knowing what will certainly please his readers most, and the artistic finesse to direct its production, then one must marvel at the genius that puts forth such an admirable piece of journalistic work as the Holiday number referred to. We are not praising it simply for the superb execution in a mechanical sense but more for its intrinsic excellence. One not aware that there is fertility in the literature of trade affairs might wonder how an artistic literary publication can be created from such resources. Let them look at this Holiday number of the Northwestern Miller and be informed. Mr. Wm. C. Edgar, whose genious as an editor and business manager has many times shone forth in great deeds in behalf of the milling industry, in this latest effort has surpassed all other achievements in demonstration of his fitness to uphold the standard of his journal as the chief exponent of a great commercial interest. It will be many a day before this peerless piece of journalistic work is equaled by any other publisher. Such of our readers who may wish to possess a specimen copy of this publication may obtain it by remitting 50 cents to the Northwestern Miller, Minneapolis, Minn.

ENGINEERING AND ARCHITECTURAL JURISPRUDENCE, a presentation of the law of construction for engineers, architects, contractors, builders, public officers and attorneys at law; by John Cassan Wait, M. C E , LL. B , New York. Price, cloth, $6.00; sheep. $6.50 John Wiley & Sons.

This book is intended to supply a long-felt need to the industrial world, as well as to furnish attorneys at law with a complete digest of the Law of Engineering and Architectural Construction, as exemplified and set forth in the several thousand cases cited.

In its preparation the author has sought to apply an excellent training in the law to a large, practical and technical experience in engineering and construction work, and in doing this he has taken special pains to make it clear and comprehensible to laymen who are not versed in law. To that end legal terms have been avoided except where necessary or very desirable. Instead of the terms "plaintiff and defendant," or "parties of the first and second part," the author has avoided much confusion by using the terms owner, builder, contractor or sub-contractor. Throughout the book the principles and application of the law are illustrated by examples which have occurred in construction work and which may arise any day in the experience of every engineer, architect, contractor, builder or owner who is engaged in building. Part I. is especially designed for the use of students of engineering and architectural schools. The book is carefully cross-referenced and indexed, citing several thousand authorities, which are compiled in a table of cases.

Part II. upon bids and bidders, their rights and liabilities, will be appreciated by public officers and contractors, for therein are discussed many questions which have been the subject of much litigation.

The contract stipulations given and discussed in Part III. have been chosen from a collection, made by the author, of several thousand specifications and contracts, and which have been in use by the governments, principal cities and largest corporations of the United States, Canada, England and Scotland. Long and short forms have been given, and the draftsman furnished with the full phraseology in which the different contract stipulations have been expressed; comprising a valuable collection of forms or precedents.

Part IV. upon the employment of engineers and architects, may be perused with profit by any professional man or servant, but it contains most instructive lessons for proprietors of estates, who frequently engage the services of architects and engineers without the formality of a special agreement. The book, from beginning to end, contains much information of value to any person or corporation contemplating the erection of any structure, be it a cottage or a viaduct.

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THE CONSOLIDATED PNEUMATIC TOOL COMPANY....

Offices, 1404 Bowling Green Building,
NEW YORK,

Announces

THAT IT HAS PURCHASED all of the patent rights, [illegible] of the Chicago Pneumatic Tool Company and of the Boyer-Ingersoll Company.

THAT IT HAS PURCHASED all of the patent rights, [illegible] of the Chicago Pneumatic Tool Company and of the Boyer-Ingersoll Company.

THAT IT HAS DEVELOPED and perfected a new Pneumatic Tool [illegible] patented, [illegible] that will be [illegible] patented and [illegible] Tools ever produced.

THAT IT IS PREPARED to supply either the Chicago Pneumatic Tool Company's or the Boyer-Ingersoll Company's well known types of Pneumatic Tools at prices [illegible] Sixty Dollars (60) per Tool.

THAT IT WILL SEND ANY one of [illegible] Tools upon receipt of [illegible] per month, [illegible] at the expiration of [illegible] per month, [illegible] their merits or [illegible].

THAT IT CONSIDERS the [illegible] to [illegible] to the best interests of [illegible] and [illegible] to the patented [illegible] Tools [illegible] Tools [illegible] Tools

CONTRACT NEWS.

South Bend, Ind.—Messrs. James and J. D. Oliver have engaged Shepley, Rutan and Coolidge, of Chicago, to make plans for the new hotel to be erected on the present site of the Oliver house. The new hotel will be of five stories and possibly of six.

Cleveland, O.—Steffen & Hardway, have prepared plans for a $60,000 theatre building to be erected in the rear of the Crocker Block on Superior St. The chief stockholders in the enterprise are W. H. Price, president of the Savings Bank of Norwalk, and Charles Stewart, secretary of the Euclid avenue Savings Bank, who recently purchased the Crocker Block.

Minneapolis, Minn.—Arrangements are being made by the German Catholic Society to build a $50,000 church in the northwest part of the city. Address Rev. B. Sandmeyer, 1410 Eighth street S.

Wellsville, O.—The congregation of the First M. E. Church voted to build a new church at a cost of $20,000.

Bristol Va.—Congressman Brownlow, of the First District of Tennessee, has introduced a bill in Congress, Washington, D. C., to have a public building for postoffice and other purposes erected in Bristol. Amount $100,000.

Buffalo, N. Y.—At meeting of trustees of the Buffalo Savings Bank recently, the plan of Green & Wicks for the new $300,000 home of the bank was accepted.

Toledo, O.—The county commissioners are considering the advisability of applying for authority to build a jail at a cost of $100,000.

Port Huron, Mich.—The Port Huron masonic lodges have decided to erect a temple on the site where the Y. M. C. A. started a building two years ago. The temple will probably be 100x120, and the first floor may be rented to the city for a library.

Niles, Mich.—On the 218th anniversary of the discovery of St. Joseph river by Chevalier de la Salle, the North Indiana and South Michigan Historical Society met at South Bend and decided to erect a granite monument at the old portage, seven miles north of Niles, where La Salle established a trading post. A pretty park will be laid out. Some traces of the old post still remain. The site of Fort Miami, near Niles, will also be marked.

Battle Creek, Mich.—The committee on the soldiers' monument met and decided upon the plans of A. D. Ordway of this city.

Belvidere, Ill.—The Congregational Society has matured plans building a new church. J. F. Whittlesay, room 29, 90 La Salle street, Chicago, architect.

Wabash, Ind.—The Methodists of this city decided to erect a new church to cost not more than $30,000. Plans will be asked of architects at once, and the church will be finished before the end of next year.

Toledo, O.—Plans have been prepared by A. Druiding, 163 Randolph street, Chicago, for a church to be erected by the Good Shepherds. Rev. Father O'Brien, 530 Clark street, Toledo.

Green Bay, Wis.—The Brown County Board have accepted plans prepared by Ferry & Claus, Milwaukee, for a jail and sheriff's residence to be erected in the spring.

Houston, Tex.—The International and Great Northern Railway have secured plans for a $20,000 depot. A. L. Bowen superintendent of building.

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NOTES FROM QUARRY AND SHOP.

A ledge of black granite which takes a beautiful polish has been found on the farm of Alonzo Casey on Hermon Hill, five miles from Bangor, Me. There is said to be a prospect of actual quarrying at no distant day.

Fair Haven, Vt.—R. E. Lloyd is opening a quarry just north of the Evergreen slate quarry.

Charles H. Newton, of Calais, Me., president and general manager of the Red Granite Company, of Calais, deceased.

John Thompson, granite manufacturer of Quincy, Mass., died at his home Dec. 5, aged eighty-two years.

Boston—In the United States Circuit Court, Dec. 3, before Judge Aldrich, a verdict of $2,000 for the plaintiff was returned in the case of John Kivinen vs. the Cape Ann Granite Company. The suit was brought to recover $5,000 damages for personal injuries. The plaintiff, while in the defendant's employ at its quarry at Gloucester, was injured by the falling of a derrick. W. A. Pew, Jr., for plaintiff; W. B. Sprout and C. S. Knowles for defendant.

Milwaukee, Wis.—Stockholders of the Waukesha Stone Company are endeavoring to have the assignment which was made to A. W. Goetz, Jr., on Oct. 16, set aside. The argument is being heard by Judge Johnson. Augusta Knie is the moving stockholder and she is joined by her husband, Oscar Knie. It is contended that the directors voted to execute the assignment without submitting the matter to the stockholders for their decision, as required by the by-laws of the company. It is further contended that but 30 per cent. of the stock has been paid in and that if the balance of the amount is paid there will be sufficient to meet all of the outstanding liabilities and leave a large surplus besides. The petition of Mrs. Knie shows that herself, Oscar Knie, her husband, Fred Kraus, the Nunnemacher estate and Daniel Mayer are the stockholders of the company. She says there is $70 due upon her stock; that there remains unpaid $14,210 upon the stock of her husband; $27,720 upon the stock of Fred Kraus; $25,620 upon the stock of the Nunnemacher estate and $2,450 on the stock of Daniel Mayer. Judge Johnson some time ago entered an order permitting the sale of the quarries and this sale has been enjoined, pending the decision of the court upon the legality of the assignment.

The stonemasons of Minneapolis are discussing a plan for issuing Building Trades Council working cards, which, it is believed, will not only dispose of all objections offered by the unions opposed, but will prove of great benefit to the council and its affiliated union.

An instructive object-lesson showing in part the wonderful mineral resources of Pennsylvania has been arranged by the School of Mines at the State College. It is a column composed of 281 samples of building stones, procured from 139 localities in the state. The base block of conglomerate is 6x6x2.5 feet; the height of the column is 32.7 feet; the weight is 53.4 tons. To Pennsylvania builders this polylith will prove more interesting than any Egyptian monolith, as it furnishes an excellent comparative test of the abilities of the various stones to withstand atmospheric influences, and is at the same time a guide to the natural resources of the commonwealth.

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Berkeley, Cal.—Professor Frank Soule, head of the civil engineering department of the University of California, has completed a series of tests for determining the strength of California marbles, which show that the product of this state compares very favorably with the best marble of other places. The highest resistance was fifteen tons to a cubic inch, that amount of pressure being necessary to crush a single piece of marble.

Cement pipes are made cheaply by an ingenious process devised by a French inventor. A trench is dug and the bottom filled with cement mortar. On this is placed a rubber tube covered with canvas and inflated. The trench is then filled up with cement. As soon as this is set the air is let out of the rubber tube, which is then removed and used again in another section. By this method six-inch pipes have been made at a cost of 22 cents a yard.

Sandstone, Mich.—The local sandstone quarry is steadily working 125 men. Heavy improvements are being made. During November more than 50,000 paving stones were shipped out, and still there are about 20,000 stacked up in the quarry yard. The stone for the state capitol will move out of the yard this month. Recently a single blast dislodged a piece of rock weighing 2,500 tons and containing over 22,000 cubic feet. It was moved from its bed by seven kegs of powder.

The San Francisco postoffice will be built of California granite. Samples of granite from quarries of the state have been carefully tested and found to meet all requirements. The abandoning of marble for granite will make necessary some changes in the ornamentation of the exterior of the building, but will lessen the cost and permit of its completion a year earlier than if marble had to be used.

The quarries of the Cambria Iron Company at Birmingham, Pa., are now idle for an indefinite period. Some 180 workmen are thereby thrown out of employment. The company claims that it does not pay them to work the quarries, as they can purchase limestone at much less figures than they have been able to produce it.

The German woman proclaims her emancipation not only by going for academic degrees in competition with the men, but by engaging in all sorts of trades in like rivalry. A recent official report shows that there are in Germany three women employed as chimney sweeps, thirty-five as slaters, seven as gunsmiths, 147 as coppersmiths, 179 as farriers and nailers, 309 as masons, eight as stone-cutters, and 2,000 in marble, slate and stone quarries.

Efforts are being made by 2,500 members of the marble industry unions in New York City to have the contract for the marble work in the new Hall of Records awarded to a resident manufacturer and not to an outside concern. The bids for the work are to be opened Dec. 14.

It is estimated by Lord Kelvin that since plants and animals began to appear on the earth a period of somewhere from fifteen to thirty million years has elapsed. Other geologists believe that a much longer time was required for the processes of sedimentation and erosion, and for the evolution of floras and faunas, of which the earth's strata bear record. Their figures make the period somewhere from sixty to one hundred million years.

A new paving material is reported as possessing many good features. It is composed of coal ashes, crushed rock, sand or iron slag and a patent cement which binds the materials together. It can be laid without heat, and be put down in layers or blocks. It is claimed that it will last twice as long as asphalt, and give a firm surface free from slipperiness. A block of it is to be laid in Columbus, O., for the purpose of testing it.

It is stated on reliable authority that the shipments of granite from Barre, Vt., during the past six months are 20 per cent larger than for the same months last year.

The demand for Washington, Vt., marble at this time is larger than the supply, and the prospects are good for a busy season when spring opens.

The San Francisco Argonaut wants the convicts of California set to work quarrying granite on the lands adjoining the penitentiary at Folsom, for the purpose of building breakwaters and quays at San Francisco, in which work the convicts of San Quentin might be employed, "with the result that this city would have docks that would equal those of London or

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Liverpool, Paris or Marseilles." Also the Argonaut desires the work extended by the use of the same labor to San Diego, San Pedro and Humbolt. "Why," it asks, "should not these malefactors, now living in idleness and semi-luxury at the expense of honest workingmen, be put to work themselves."

A Pine Bluff, Ark., marble cutter is under arrest on the novel charge of stealing tombstones and working them over for new and grief-stricken customers.

There has been organized at Portland, Me., the Bay State Granite Company, for the purpose of buying, owning and developing real estate necessary for the business of the company. The officers are: President, John J. Barry, of Quincy; treasurer, J. T. Butler, of Somerville, Mass. The company is capitalized at $500,000, of which $250 has been paid in.

Columbus, O.—The Hamilton Crushed Stone and Sand Company, of Hamilton, Butler County, was incorporated by George P. Sohngen, William Murphy, George Rupp, Horace Shields and William N. Andrews. Capital stock $10,000.

Fond du Lac, Wis.—Amended articles of organization of the Hamilton Lime and Stone Company, limited, of the town of Byron, were filed increasing the capital stock from $35,000 to $75,000 with 750 shares of $100 each.

Pottstown, Pa:—Fire destroyed the plant of P. H. Finn & Co., a granite quarry firm at Falls of French Creek, and the entire structure was consumed.

Westchester, Pa.—Fire broke out in the engine room of a large building owned by Davis Knauer at the Falls of French Creek granite quarries. The building was burned down, destroying the contents, which included a valuable stationary engine used for motor power in working or hoisting derricks, a general lot of granite workers' tools, besides other stock. The loss will be fully $2,000.

Quarryville, N. J.—The large bluestone quarries owned by the estate of the late William M. Force, at Quarryville, has been leased by Messrs. Bruckman & Kelley, well known contractors, having an office at 300 Broadway, New York. They are extensively engaged in excavations, dock filling and government and municipal work and are large users of stone such as is produced at these quarries. We understand that they will also place the general products of the quarry upon the market in their finest form, shipping direct to various municipalities around New York.

Spartanburg, S. C.—John Geddes, marble, reported to have sold out.

Barre, Vt.—The granite manufacturing firm of Marr & Gordon has bought the medium granite quarry of Mann Brothers. The quarry has been operated for a number of years by Marr & Gordon under a lease. The consideratiou is private.

Tipton, Ia.—The well-known marble firm of Comstock & Conner has dissolved partnership. Mr. Conner will continue the business.

Prescott, Bulkeley & Callahan, of New York, have bought the Ola Anderson quarries on Rattlesnake Hill, Concord, N. H. Mr. Anderson retains nothing but his sheds, which would not be required by the new purchasers, as they intend operating from other points. The property bought consists of eighty acres.

Troy, N. Y.—T. H. Magill has purchased the McDonald stone plant and bluestone quarries at Summit, N. Y., and Lanesboro, Pa.

Carpenter's Corners, N. Y.—The Northville Granite Company has closed an option with Mr. Charles Groff and purchased the land on which the quarry is located. The work will be pushed in the spring.

Waukesha, Wis.—Assignee A. William Goetz, Jr., of Milwaukee, sold the property of the Waukesha Stone Company, at the quarries, to Fred Krause, of Milwaukee, for $29,500. Only one other bid was received, that of Frank W. Harland, of Waukesha, who offered $29,200. Mr. Krause was treasurer of the old company. The property was placed in the hands of an assignee several months ago. The company has been in existence about ten years, and until about a year or so ago did an excellent business. It is understood that the quarries will be operated on a larger scale than in the past.

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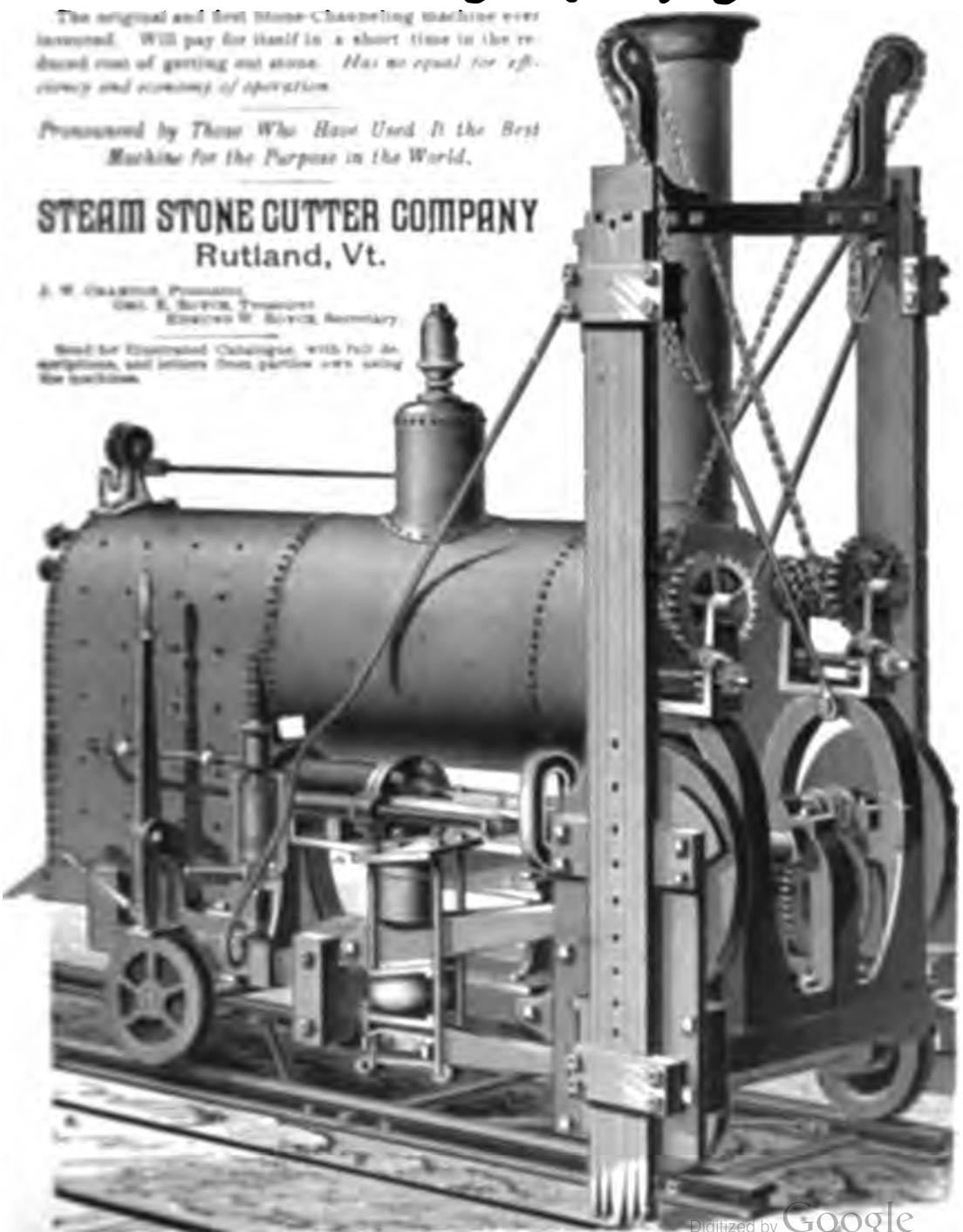
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Orland, Me.—Plans are maturing for the opening of a granite quarry on Leach's Point A party experienced in the stone business has leased the privilege with the intention of making a beginning this winter or early spring. The idea of forming a company is being circulated and several business men of means have expressed themselves as ready to go in and work the matter on a scale in proportion to the encouragement the business offers.

Pittsburg, Pa.—The Indian mound at McKees' Rocks has been leased to Petty Brothers, Pittsburg contractors, for the purpose of quarrying stone.

Little Rock, Ark.—Fred Hanger, quarries, reported to have given real estate mortgage for $20,000.

North Adams, Mass.—Edie Rich, marble dust mill, reported to have recorded chattel mortgage for $5,000.

West Point, Neb.—F. B. Alderman, marble, reported to have recorded chattel and real estate mortgage for $2,683.

Allentown, Pa.—Robert L. Martz, paving contractor, reported to have given judgment for $400.

Indianapolis, Ind.—Tyner, Boicourt & Co., granite, etc., reported to have given bill of sale for $1.

Columbus, O.—C. H. Hemming, monuments, reported to have refiled chattel mortgage for $130.

Galveston, Tex.—John N. Moser, marble, reported to have sold out.

Duluth, Minn.—A transcript of judgment from Ramsey county was filed in the district court for $455.19 in favor the Duluth Brownstone Company and against Wenisch & Bourgeault.

Plainfield, N. J.—Suit has been brought in the New Jersey Supreme Court against James E. Townsend, the marble dealer, by the Columbian Marble Company through their New Jersey attorney, City Judge DeMeza, for $2,000 for goods alleged to be sold and delivered.

Savannah, Ga.—The sealed verdict in the case of the Lexington Blue Granite Company against Thomas Clark & Sons, of Chicago, who built the foundation for the new public building, was opened in the city court. It was for $445.22 in favor of the plaintiff company. The plaintiff brought suit for something more than $1,000.

St. Louis—The Pickel Marble and Granite Company has obtained a judgment for $3,352.80 against S. L. Jones et al. for work done and material used in the Oriental Theater building.

The Consolidated Stone Company, Bloomington, Ind., has compromised the claim of Mrs. Theodore Pigg for the death of her husband a short time since in the company's quarry. The amount paid is said to be $500.

Quincy, Ill.—August Lange, who brought suit against the Menke Stone and Lime Company for $1,500 damages for having a foot crushed while in its employ, on a second trial of the case was awarded the sum of $80 in the verdict of the jury.

In the suit of Alice M. Winstandley vs. the Bedford, Ind., Stone Mill Company, in which M. M. Kann, of Pittsburg, filed a cross complaint for foreclosure of a mortgage of over $16,000, Judge Martin gave judgment for Kann. This will render the sale of the mill property necessary.

St. Louis—Until three years ago Albert W. Robinson was a wealthy business man of St. Louis. He has been taken to the City Hospital for observation as to his sanity. An investment in a quarry enterprise and later in a vinegar establishment is assigned as the cause of the man's loss of wealth. It is believed that long brooding over his reverses is responsible for his mental condition.

The Barre, Vt., Granite Manufacturers' Association held its annual meeting and elected the following officers: President, William Barclay; first vice-president, H. K. Bush; second vice-president, J. A. Cross, Northfield; secretary, T. H. Cave, Jr.; treasurer, W. J. Higman; auditors, Hugh Jones and John Smith.

Chicago—The engineering committee of the sanitary board have decided to insist upon the use of Illinois limestone in the foundations of the new bridges, the bids for which were presented last week. The contracts made with the railroads did not specify the stone to be used. The Santa Fe objected to the use of Illinois limestone in the foundations of the eight-track bridge at Campbell avenue and at

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Summit avenue and Twenty-sixth street, stating that it was not suitable for the work. It is said that some of the bidders for the foundations will resist the award of the contract to Leyden & Drew on the ground that they understood from the railroad people that Illinois limestone was barred.

Chicago—The directorso f the Western Stone Company will not declare a dividend at their meeting in January. This is authoritative. It was learned from an official of the company that the yearly report will show a reduction of about $19,000 of the bonded indebtedness and an additional surplus approximating $25,000. "The year has been the worst in the history of the stone trade—by the year I mean taking the twelve months en bloc," said a director of the company. "The months of October and November exhibited a great improvement over the same period last year, but taken all in all 1897 was a very bad one for the stone trade. We were fortunate indeed in paying off some of our bonds and to turn something to the surplus account. But all signs point to a very prosperous time next year. We have already enough contracts in view for 1898 to justify the estimate of the best year in the history of the concern."

Marion, Va.—W. B. Dinsmore, of New York, has opened a limestone quarry.

Chehalis, Wash.—Joseph McCabe of the Northern Pacific Railway, has secured possession of the extensive stone quarries of Pe-Ell.

Denver, Colo.—At a special meeting of the stockholders of the Denver Onyx and Marble Company it was voted to issue first mortgage bonds to the amount of $300,000 on the company's property. A majority of the stock of the consolidated Beulah and Denver companies was represented at the meeting. As soon as the bonds are disposed of and the cash realized upon them is in hand, the company will proceed with the development of the quarries in Pueblo and Gunnison counties on an extensive scale. In addition to the contract for the marble work in the capital building, which is yet far from complete, the company has a large number of orders and contracts to fill within the next year or so. The floors of the state house will require nearly 70,000 feet of white marble, and as only about 5,000 feet of the material has been laid, it will be necessary to work the quarries at Marble City in Gunnison county, from where the white tiling is being obtained, to their utmost capacity in order that the company may finish the floors without applying for any farther extension of time on the contracts.

Barre, Vt., is to have another large industry added to its present numerous lot. It will employ 100 hands on the start. Cook & Watkins, large granite dealers of Boston, have taken a five years' lease of the stone sheds owned by L. J. Brewster. The firm intends to take hold and open the sheds right away. Cook & Watkins is a well-known firm in Boston, where their head office is located. The firm does a large wholesale business. It will do monumental work, as well as make all kinds of cut stone.

Great Barrington, Mass.—There is a rumor that one of the idle quarries is to be again reopened, several interested persons having been lately looking over the ground; one gentleman who was here in the fall, and whose experience in such matters ought to be unquestioned, was heard to say that a fortune awaited the man who had the capital to open, and the knowledge to run, a certain quarry west of this village.

Ames, Ia.—Ames has secured the location of a marble and granite works that will be owned and managed by John R. Canty, late of Toledo. He intends to locate at once and will employ not less than six men.

Oakland, Cal.—It is reported that Prince Poniatowski and his associates in the building of the Sierra railroad have made arrangements to work the Columbia marble quarry and will commence taking out large quantities of stone for building purposes. The Sierra railway will probably be extended from Jamestown to Columbia, near which place the quarry is situated.

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An electric railway for freight and passengers has been organized for a line covering the slate quarry district of Vermont, the points touched being Fair Haven, Castleton, Hamden, N. Y., Hydeville, Lake Bomoseen, Poultney, East Poultney and Middletown Springs. It will be built next summer.

Leesburg, Va.—The stone quarry belonging to Leroy Veney, about three miles south of Leesburg, has been purchased by Mr. H. C. Wilson, of Washington. The stone is finely suited for lithographic purposes and will be worked out for that purpose.

New Haven, Conn.—Edward O'Brien, stone dealer, has made an assignment. Alonzo Van Nostrand has been named as trustee.

West Superior, Wis.—Beargrauet Stone Co., reported to have given bill of sale for $258.

New Westminster, B. C.—Alex. Hamilton, marble works, reported to have given judgment for $3,332.

North Adams, Mass.—Charles Dolle, quarry, reported to have recorded chattel mortgage for $500.

West Point, Neb.—F. B. Alderman, marble, reported to have recorded chattel mortgage for $1,500.

Rushville, Ind.—Warren S. McManus, formerly a traveling salesman for J. B. Schrichte, a monument dealer of this city, has been placed under $500 bond on a charge of embezzlement. The indictment charges him with appropriating $20 of Schrichte's money to his own use.

The National Slate Manufacturing and Roofing Association, of Pittsburgh, Pa., have elected without opposition, W. P. Lupton, as President, and J. H. McClarren, Secretary. This association was organized about a year ago, to maintain a uniform price. It is claimed that there will be a general building boom next spring, and the roofing men want to be in line for business, and will insist only on uniformity.

Katsbaan, N. Y.—The limestone quarries have discharged most of their men for a time, but expect to resume work early in the spring. They are expecting a large contract for anchorage stone which will enable them to use up large piles of rock which were not fit for pier blocks.

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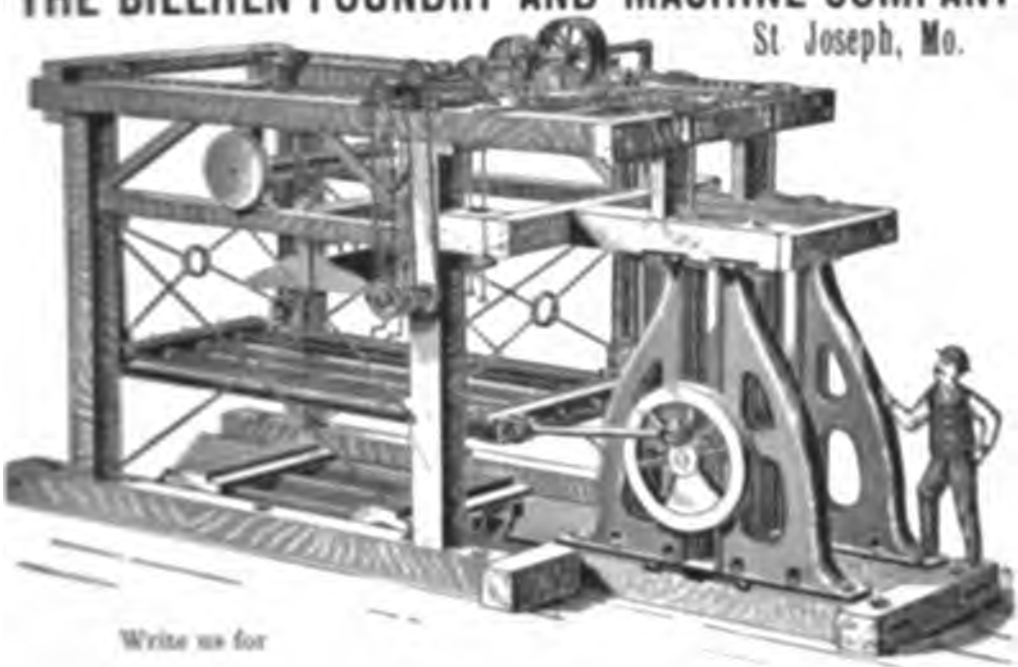
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New York.—The marble industry of this city, including the Reliance Labor Club of Marble Polishers and the Compact Labor Club of Marble Cutters' Helpers, has written to the Board of Estimate and Apportionment requesting that when the contract for the marble work of the new Hall of Records is given out that it provides for the employment of citizens of this city and for the payment of the union scale of wages.

Byram, Pa.—Business is booming at Shanley's quarry where three crushers are now in use breaking stone and another one is to be put up soon. About fifty men are employed getting out the stone and from twelve to sixteen cars are sent away daily. The firm has a large contract to furnish ballast to a railroad in South Jersey and if the weather keeps favorable the work may continue all winter. M. F. Berger, who also has a quarry at Byram, has a gang of men at work getting out stone and crushing them and sends out several carloads every day.

Milwaukee, Wis.—Charles O. Manegold, who formerly owned large stone quarries in Wauwatosa, died at his home in that township at the age of 47 years.

Fair Haven, Vt.—Minogue & Greer, slate, Thomas Greer deceased.

New York, N. Y.—William Thomas Ritch & Co., foundation stone, succeeded by William Thomas Ritch.

Groton, Conn.—C. H. Card, granite, etc., reported to have sold to Carlos W. Allyn.

Cincinnati, O.—A deal has been made by which Franklin Alter has become the joint owner with Ross Hamilton of the Crudup Stone Company. The quarries of the company are in Kentucky and the stone taken out is of the freestone variety for building. The Alter interests were purchased from D. Crudup and his sons, the original owners of the quarries, for $15,000. The company now has contracts for $160,000 worth of stone to be delivered in the East, besides what is being delivered in this city and surrounding territory.

Oxford, N. Y.—It is reported that William Lally, of Norwich, Conn., has made arrangements with New York parties and will open up the Bennett stone quarry the coming year. Mr. Lally will move to Oxford and take charge of the business.

Greensburg, Pa.—The firm of Geo. W. Good & Co., contractors and dealers in stone, sand and builder's materials, has been dissolved, Geo. W. Good retiring. The business will be continued by Messrs Jesse Allshouse and Leonard Beck, under the firm name of Allshouse, Beck & Co.

Frostburg, Md.—The J. B. Williams Marble Co., has been incorporated by J. B. Williams, James A. McLuckie, T. E. Lewis, Thomas J. Price and David J. Price. Capital stock $7,500.

New Castle, Pa.—A company composed of W. S. Moore, Charles Westlake, R. F. Dana and Oliver Moore, of this city, and H. B. Wick, of Youngstown, has been formed to operate stone quarries near Eastbrook. The stone is very rich in silica, and a mammoth plant to crush it for commercial purposes will be erected.

Racine, Wis.—The John O'Laughlin Stone Company incorporated. Capital stock $25,000. The incorporators are John O'Laughlin, Andrew O'Laughlin and Mary O'Laughlin. The plant is located at Ives station.

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SPIRAL



Sand Pump

For Feeding Sand Steel or Shot for

SAWING STONE.

Of all Kinds. Does More Sawing, Uses Less Sand and Water, Requires Less Power and Repairs than any other. Runs only 20 revolutions per minute Pays for itself in Six Months.

FRENIER & LeBLANC, Rutland, Vt.

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"Lang Lay" Wire Rope.



Manufactured by **THE TRENTON IRON CO.** Trenton, N. J.

WATERPROOF
GRAPHITE GREASE
FOR WIRE ROPES GEARS ETC

FOR DIXON CRUCIBLE CO., JERSEY CITY, N. J.

A. LESCHEN & SONS ROPE CO.,

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AND ALL GRADES OF

Iron and Steel Ropes and Street-Railway Cables

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Lockhaven, Pa.—A force of men under the direction of Councilman G. C. Peeling are at work on the farm of Jesse Laubach, in Bald Eagle township, getting out stone that in appearance is like blue marble. It is soft in character and is easy to polish. It can be used for building purposes or for monuments. The Lock Haven Granite Company is opening the quarry. Many men who have been shown specimens of the marble expressed the opinion that the stone or marble will be useful for many purposes. Steam drills will soon be put in and the work of getting out the marble in large quantities will be vigorously pushed.

Columbia, S. C.—A meeting of the Columbia Granite Construction and Manufacturing company was held, and the following board of directors was elected: George Cotton Smith, B. L. Abney, T. A. McCreery, F. Vanbenthuysen, W. B. Lowrance, Geo. A. Shields, Joseph McCreery. The board elected Mr. Abney president. The company expects to develop certain property owned by it at an early day.

A valuable quarry of pink granite has been discovered on the farm of Moseman B. Hyatt, in Southeast, Putnam county, New York. An expert has recently tested specimens from it and pronounces it of superior quality, It is expected that operations for its development will be commenced in the near future.

Grand Rapids, Mich.—David Moreau, the marble dealer, made an assignment to the Michigan Trust company, who will close out the business and settle with creditors. The assets are $840 and liabilities $1,482, distributed as follows: George N. Davis, note, $250; W. D. Talford, rent, $100; W. D. Cody, note, $60; Davidson Marble Company, Chicago, note, $75; Jones Bros., Chicago, general merchandise, $55; R. C. Bowers Granite Company, Montpelier, Vt., $33; Merry Mount Granite Company, Quincy, Mass., $46; Vermont Marble Co., Proctor, Vt., $95; National Granite Company, Barre, Vt., $160; James D. Cloyston, Montpelier, Vt., $143; Sproul & McGurrin, $20; New York Granite Company, $124; Thomas Fox, Concord, N. H., $45; Davidson & Sons, Chicago, $170; Wolf & Co., Mansfield, O., $56; Andrew Fyfe, Grand Rapids, $50.

Eastabrook Brothers, marble dealers in Carbondale, Pa., have made an assignment for the benefit of their creditors.

Cows barren 3 years
MADE TO BREED.
Book Free Moore Brothers, Albany, N. Y.

"KRUSHITE."
The Best and Cheapest Abrasive for
Sawing Stone.
CIRCULAR AND SAMPLE FREE FROM
FRENIER & LeBLANC, RUTLAND Vermont.,

HOISTING, MINING, BRIDGE ERECTING,

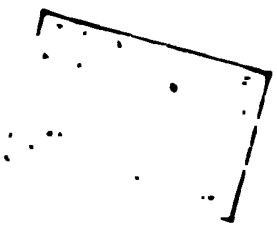
Dock Building, Pile Driving, Coal Hoisting and Quarry Engines
of any power, Sugar Cane transferring engines, transferring machines for depositing cane from car to carrier, with my improved Patent Friction Drums with or without Boilers. Any amount of reference given. Established 1870. Send for Catalogue.
J. S. MUNDY, Newark, N.J. 1744 Market St., Philadelphia, Pa., 22 Light-st Baltimore, Md., 117 Water-st., Pittsburgh, Pa., 24 Market Street, Chicago, Ill., 13 N. Third-st., St. Louis Mo., 34 Fremont St., San Francisco, Cal., 85 Front-st. Portland Ore., 218 Congress-st., Boston, Mass.

HOW ABOUT ROCK DRILLS?
I have the following for sale:
5 No. 1, 2¼ in. Rand "Little Giant" Rock Drills.
8 No. E 26, 3¼ in. Sergeant Rock Drills.
40 No. F 2, 3½ in. Ingersoll Rock Drills.
12 No. 4, 3⅜ in. Rand "Little Giant" Rock Drills.
All repaired and in guaranteed condition.
All the same price—$125 each, including Tripod and weights.
Can furnish immediately.
I also have Channelers, Compressors, Hoisting Engines, etc.
You want some of these. Act promptly.
WILLIS SHAW,
Contractors' Machinery,
506 N. Y. Life Bldg., Chicago, Ill.

QUARRY PUMPS.

CHEAPEST. HANDIEST. SIMPLEST. PUMPS.
Handling Dirty, Gritty and Sandy Liquids, without Wear, Oil or Care. Pumping outfits for Contractors, Mining, Irrigating, Railroad, Quarry, Drainage and Manufacturing purposes. Second-hand Engines, Boilers, Pumps, and other Machinery always on hand. Exchanging.
MASLINS, 165-167 First St., Jersey City, N.J.

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CYLINDER-PIER BRIDGE, RIGA-OREL R. R., RUSSIA.

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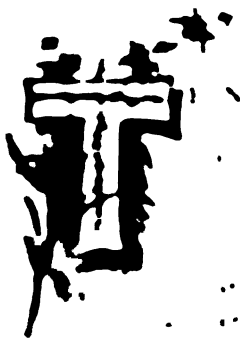


CYLINDER-PIER BRIDGE, RIGA-OREL R. R., RUSSIA.

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STONE

COFFER DAM PROCESS FOR PIERS VII



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the inclined ones were of frequent trouble and the vertical ones none whatever.

"If it is essential to increase the bearing surface at the bottom of the caisson to an area which is not required in the upper portion, this end can be secured by a vertical cutting shoe of considerable height, with a step or steps into the smaller diameter. This is quite as efficient to secure the end in view as a long incline on the cutting shoe, and has decided advantages. In the denser material the vertical sides leave the ground undisturbed for some height close to the skin of the caisson, and a vertical guide is secured

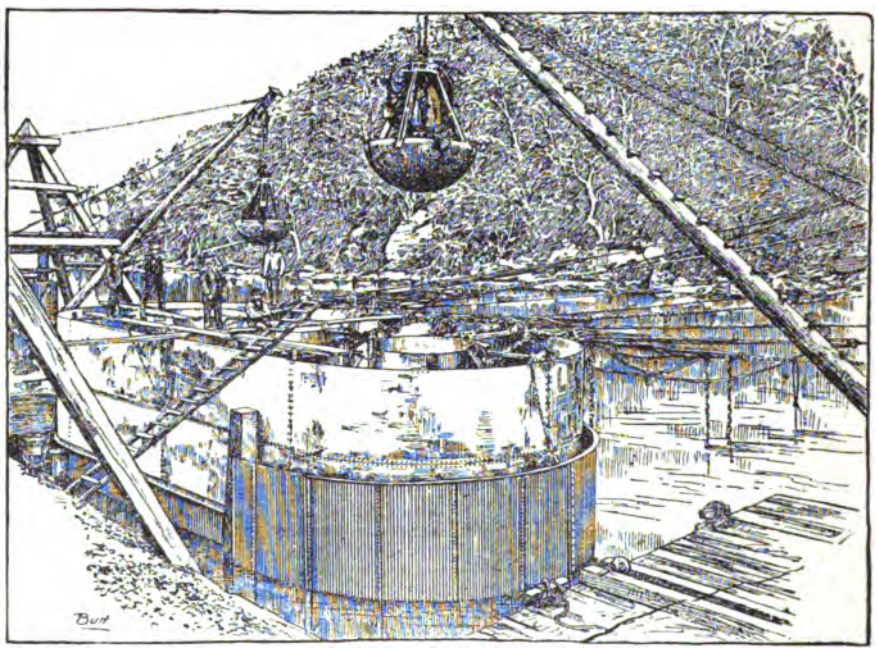


FIG. 57.—HAWKESBURY BRIDGE.—Caisson No. 6 in Process of Sinking, Showing Excavator and Shore Chains for Maintaining Vertical Position.

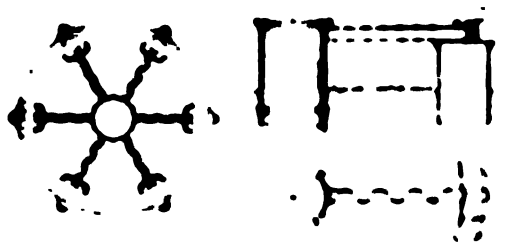
which is entirely wanting in the case of an inclined shoe. This guide is valuable in cases where the soil may differ in density under the shoe, and particularly so if the excavation has been carried too far below the bottom of the shoe. With an inclined shoe and a slip of soil into the dredging well from one side more than another, experience in deep dredging has shown that there is a decidedly greater tendency to a horizontal movement than with a vertical shoe. The former has a flare to direct this sidewise motion in the first place, and nothing but a certain amount of disturbed material above the shoe to resist this tendency."

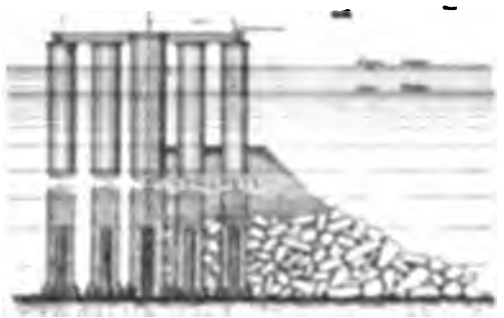
The above account is from the Engineering News of January 5, 1889,

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work having been done under the direction of J. F. Anderson of the firm of Anderson & Barr. The shells were filled with concrete up to low water and masonry from low water up to the top of the piers.

The work may be made water tight by covering the joints with tarred canvas and painting over with extra thick plates are used this can be covered with the plates opened some farther apart. The joints may be made with red lead and asbestos cord or a very much better appearance may be obtained by the use of putty joints and it desirable to avoid caulking them a caulking [illegible] may be used to make the joints tight. There is usually a [illegible]





[illegible]

The [illegible] piers [illegible] are [illegible] at the back of the stream with

one pile extending up into the center of each tube about six feet, around which the concrete was deposited, thus preventing displacement. Concrete and stone were placed on the outside up to 15 feet, as a protection.

This work was described by Martin Murphy in Trans. Am. Soc. C. E., Vol. 29, who also describes a pier for the Victoria bridge, over Bear river, constructed with two tubes, resting on piles cut off at the bed of the stream, but having four piles inside each tube. (Fig. 59.) Around the outside are timber, concrete and broken stone as a protection. The saw used for cutting off the piles under the water was very much simpler than the one shown in Fig. 35, and is illustrated in Fig. 60.

Cylinder piers on European work are often of very elaborate construction. The bridge on the Aa, at the crossing of the Russian Riga-Orel railway, is supported on elegant cylinder piers, with moulded caps, steel cut-waters, and are braced together with cylinders transversly. (Fig. 61.) This forms a very efficient construction, but so expensive to manufacture that it is usually replaced by bracing of struts and rods, as in Fig. 59, or by a metal diaphragm (Fig. 62), stiffened with angles.

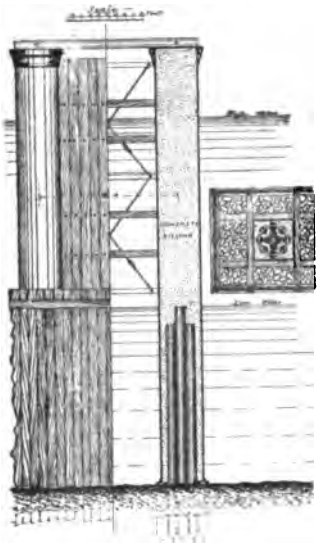


FIG. 59.—PIER OF TWO CYLINDERS, VICTORIA BRIDGE.

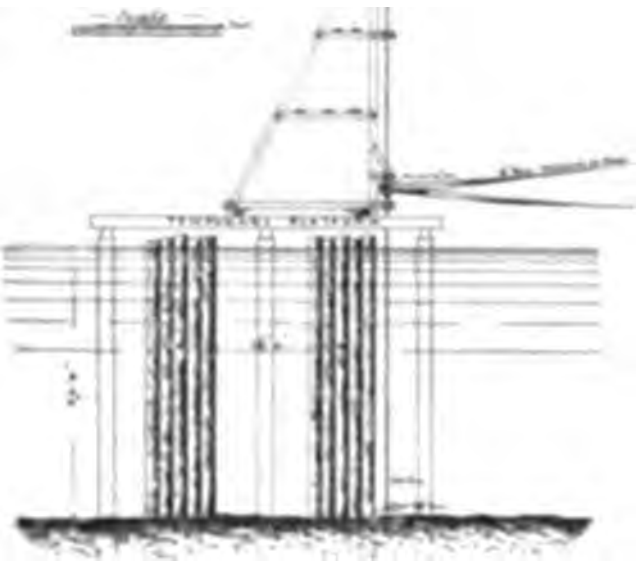
Cylinders of water-tight construction and of large diameter may be used as coffer-dams, where they are sunk into impervious strata, or by sealing them with concrete around the bottom where they are placed upon smooth rock bottom. In the construction of light-houses such cylinders have been placed upon clean rock bottom through from 12 feet to 18 feet of water and concrete deposited around the circumference of the base outside and inside to make them water-tight, after which they were pumped out and the foundation laid.

To withstand the pressure of any considerable depth of water the thickness and strength should be calculated and the construction carefully designed. Unless the depth of water exceeds ten feet, or the diameter of tube exceeds six feet, the minimum thickness it is advisable to use, will be sufficient for strength.

This refers only to quiescent pressure, and any shock must be carefully considered and taken account of, by interior bracing if necessary.

The most thorough discussion of the strength of thin, hollow metal cylinders is given in "Elasticitat and Festigkeit," by C. Bach. This considers the cylinder to have sides of a greater thickness than is true with

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under the direction of Sir John Fowler and Sir Benjamin Baker, required the use of various methods to reach solid bearing, as the enormous weight to be carried required the most substantial piers obtainable.

The use of coffer-dams of metal for the Inchgarvie piers is described by Engineering: The site of the two north or shallow piers being wholly submerged at high water, and about half in the case of the northeast and three-fourths in the case of the northwest pier, submerged also at low water, the preliminary work was tidal, and between spring tides no work could be carried on at all at this place. When it is considered how opposed the position was there—the work having to be carried on upon a narrow ledge of rock attacked by wind and waves from all sides—it will be understood that the progress could not be very rapid. The conditions of the contract here required that the rock should be excavated in steps, and that the rubble masonry comprising the foundation of the circular granite piers (Fig. 63) should be bound by an iron belt 60 feet in diameter and 3 feet deep; the highest portion of the rock upon which this belt rested to be 2 feet below low water; the belt, or at any rate a part of it, to be brought down to form a protection for the foundation rubble masonry upon the lower steps.



FIG. 62.—CYLINDER PIERS, WITH DIAPHRAGM.

It was therefore decided to cut a chase 8 feet wide (3 feet to the inside and 5 feet to the outside of the 60 feet circle) out of the rock where it was higher than 2 feet below low water, to make the 60 feet belt of three thicknesses of one-half inch plate and to carry the center plate downward, after it had been cut, in such a manner as to fit as nearly as possible the natural contour of the rock. (Fig. 64A.) A light staging was, therefore, erected above high water, the correct center of the pier placed upon it, and by means of a trammel-rod 30 feet in length, from the end of which a pointed sounding-rod was suspended, a correct reading was taken every 6 inches on

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... ...

the space between the two being made up by clay puddle well stamped down. Any split or hole or crevice in the rock was also filled with clay. Upon these two lower rows other bags were now laid crosswise; upon these, two rows lengthwise, and a fourth row crosswise on the top, which was laid close up to the belt. This was done in sections of about 15 feet to 16 feet length all along the shield, but round the outside of the treble belt only two bags deep were laid. On the inside also a single row of clay bags,

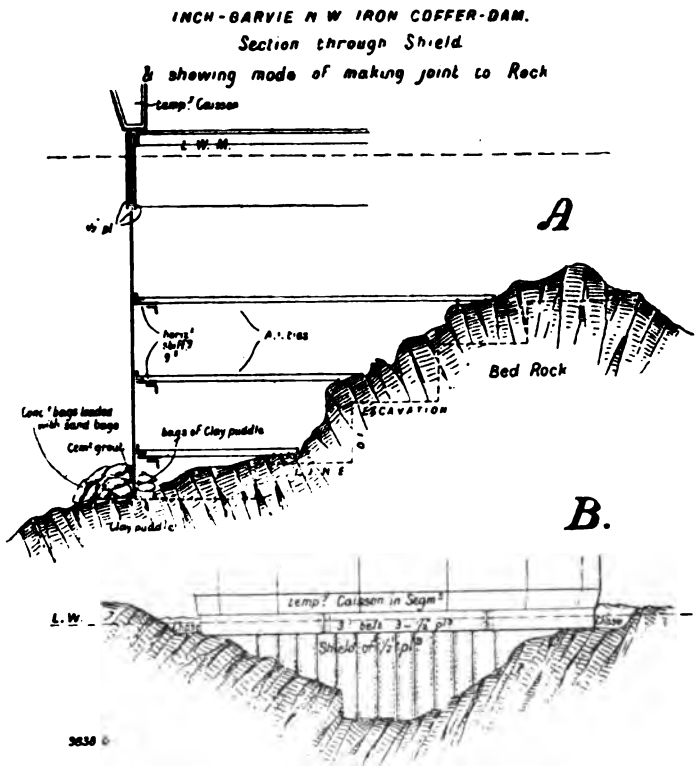


FIG. 64.—FORTH BRIDE. METAL COFEFR-DAM.

backed by a row of concrete bags, and loaded with stones, was laid round the complete circle. Cement grout, without intermixture of sand, was now prepared and passed down to the diver—but only at slack tide, high water or low water—who lifted off one or more of the top bags and poured the grout into the narrow space left, until it overflowed. He then replaced the bag and proceeded to the next division, until all was done. Forty-eight hours were allowed to elapse for the setting of the cement; the sluice valve

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rubble masonry inside had been brought up to low water level a second tier of temporary caisson was added, and the work could then be carried on at all states of the tide. While tidal work was carried on in these two coffer-dams the amount of water which had to be pumped out every tide was 250,000 gallons in the one case and 340,000 in the other. The time occupied was 50 to 55 minutes, but work was, of course, commenced so soon as the higher parts were laid dry. For pumping out smaller quantities of water collected through leaks, pulsometers or small centrifugal pumps were used.

An exterior view of the work is shown in Fig. 65, and while the method

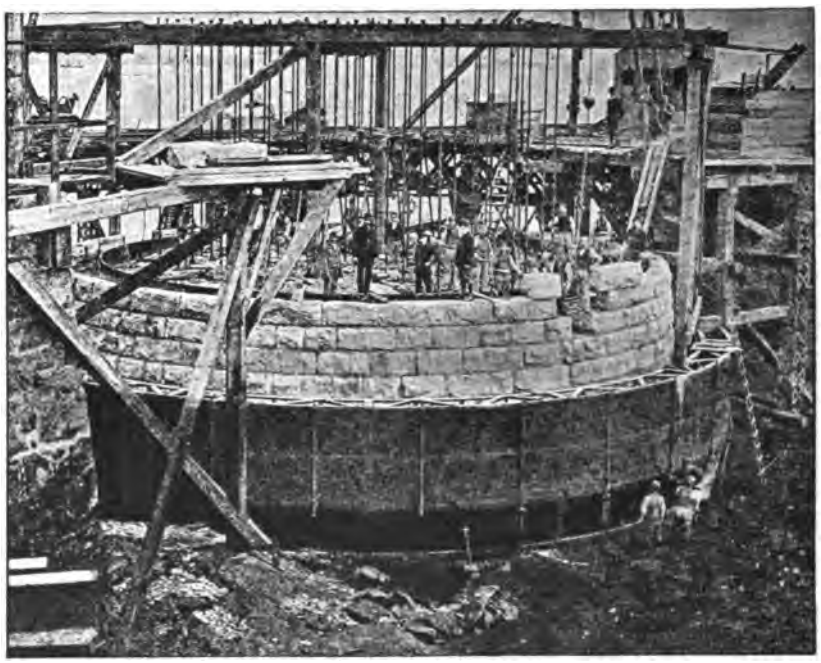


FIG. 65.—FORTH BRIDGE, CIRCULAR GRANITE PIER AND METAL COFFER-DAM.

was successful and worthy of much study, the expense would only be justifiable where the metal would be retained as part of the permanent foundation, which was the case on this work.

In many cases such a shell could be designed of the proper size for the footing course, and after use as a coffer-dam in obtaining the foundation it could be filled with concrete and serve as a base for the pier. Being made in sections vertically, portions projecting above low water could be removed and used on still other piers.

Metal sheet piles are seldom used for any class of work, and need not be

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[illegible] at length in this connection. On some harbour work at Cuxhaven Harbour, Germany, [illegible] metal sheet piles of corrugated section [illegible] were used and after being driven were found [illegible]

Whatever the class and form of material it may be decided to use in [illegible] the cofferdam method of the temporary [illegible] to the permanent foundation that as much as possible of the material used and labour employed will be of service in the finished [illegible]

Contract Journal, &c.

[illegible]

WOOD AS METAL

[illegible] that it is an ill wind that blows no good. Out of the [illegible] destroyed by the great fire in [illegible] appears to be arising [illegible] and good. In the [illegible] timber trade appears likely to have a share. One [illegible] the Timber News is assured that [illegible] have been [illegible] statements have been proved to be [illegible] We have not the [illegible] We are [illegible] We are [illegible] We have [illegible] Steam [illegible] He has more than [illegible] at there [illegible] the latter [illegible] stage [illegible] of the [illegible] grave danger to the [illegible] has been [illegible] the [illegible] [illegible] may be [illegible] and [illegible] Three [illegible] [illegible] being [illegible] the [illegible] of metal, at the greater use of wood [illegible] [illegible] [illegible]

[Contributed.]

THE JEWS IN ART AND ARCHITECTURE.

AMONG the earliest biblical references to architecture is the story of the tower of Babel, which as the primitive people of Asia believed, reached from earth into heaven. The Semitic theory of the firmament was that the earth was a flat body and that the heavens, in seven compartments or strata, were immediately above it. Hence, according to this belief, the structure need not have been very high to reach to the first heaven.

In the second book of Moses a whole chapter is devoted to the description of the holy tent, detailing the historical events, in plastic forms, of Israel's earliest life. Denorah's epic song, Hannah's thanks-offering, the powerful speeches of Samuel, the psalms of David, the proverbs of Solomon, the soul-striking admonitions of the prophets Isaiah, Hosea, Micah, Amos, Obadiah—all exhibit the intense genius which are conclusive evidences of the desire to portray in an artistic manner nature's noblest gift to man. In an architectural sense the grand structures of the temple, fortifications, subterranean canals and water-ways of King Solomon and the succeeding kings show clearly how the people had progressed in the arts and sciences, even if Hiram Abif, the Phœnician architect, was called in to direct the works in the Jewish capital.

Plato and Aristotle designated art as an imitation of the real and entitled it Mimesis. The biblical conception is opposed to this idea, because the Greeks worshipped nature as the highest and most exalted and did not recognize anything outside of it. The people of India, too, deemed nature as something unclean and sinful and to be shunned, notwithstanding that they had been constructing immense temples and edifices. It is evident that the Jewish people in the primitive era recognized art only as an idealism. The decalogic injunction, "Thou shalt not make any images," must be assigned as a reason against the heathen idea of the plastic Collosi in Greece, Egypt, Babylonia and Rome. It is positive, however, that the Jewish people encouraged art in many ways, but principally as an auxiliary in the embellishment of the holy objects. They confined their artistic genius in a limited sense to designing, drawing, modeling, molding and painting, while architecture and excavation were taught and encouraged. Aside from these, poetry, rhetoric, music and dancing received more attention. It can be shown that even during the era of Moses the art of writing

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employing 10,000 of each month ly; there were 80,000 stone-cutters, and 70,000 laborers for hauling the materials were given work. The entire period of construction was seven years and six months. Expert Phœnicians were detailed to secure the costly cypress and cedar trees of Lebanon. The structure was to rest upon Mount Moriah, whose rock strata presented solid foundations. The blocks of stone were 20 feet long and 7½ feet thick, provided with singular grooves. Most of the stones were not finished during Solomon's reign, for the work was continued after his death.

Under Solomon's rule the city's walls and ramparts were largely augmented and fortified, notably the Castle Millo and other buildings on Lebanon Heights. Among his most important works was the aqueduct which furnished the city's water, taken from Etham and the vicinity of Jerusalem and south of Bethel. Of this there are ponds in existence near Artas. A palace was erected by his orders upon Zion's Hill which required thirteen years for its completion. It was 30 ells high, 50 ells wide, and 100 ells in length and was three stories high, having four galleries in the interior resting upon cedar columns. This edifice was used as a public convention hall as well as a place for exhibiting costly armors and utensils. In the middle of this palace was a thoroughfare, thirty ells wide, flanked on each side by cedar columns. It could be reached only by a series of steps, leading into the ante-chambers of the throne and the department of justice. In the rear part of the edifice which contained the palace proper, together with the harem, was the culmination of exquisite adornments. This structure was of square blocks of stone, while the interior walls were covered with valuable woods from India.

Until the end of the exile from Babylonia all art was circumscribed by the injunction of the Decalogue. But the advent of the Maccabees, when the second statehood of Israel took a new start, Grecian influence made itself manifest, so that under Herod's reign palaces and buildings were erected that were in the most approved Grecian style. Especially were public baths, theaters, gymnasiums, ramparts and fortifications, not only in Jerusalem, but throughout the principal cities of Palestine, built after the Greek style. Then the arts and sciences were more and more to be fostered and magnificent works were undertaken, of which visible traces are to be found to-day.

The Talmud especially has many references to the forbidden clause against painting and designing. They relate even that the palace of Herodus Antipas of Tiberias was destroyed because it contained images of the animal kingdom, and that the portraits of the emperor, as field signs of the Roman soldiers, were not permitted in Jerusalem.

It appears, however, that at the close of the first century the biblical interdictions against drawings of animals were set aside. Thus the patriarch Rabbi Gamliel exhibited no opposition to the representations of the new

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MARBLE TRADE IN EAST TENNESSEE

force of men. It is an excellent quarry and a large quantity of marble is being gotten out.

The Southern Lime company has just opened a large quarry at Sharp's Gap, from which marble will be quarried to be burned into lime.

T. S. Godfrey's quarries are running regularly and a large amount of stone is being turned out.

The quarries of the Tennessee Producers' Marble company just east of the city on the site of the old Frierson quarries, will be made larger. A contract has just been awarded for the opening of another big quarry near those now in operation. A gang of men will be put to work in it as soon as the winter breaks. About sixty men are now at work in the quarries of the company and the output is extensive.

The two quarries in the Seventeenth district, that of Monday & Kries, and the Evans Marble company, are running regularly. A large force is at work in each of them, and a considerable amount of marble is being quarried.

The quarries at Concord have not been in full operation for some time past. The Cedar Bluff marble quarry, about six miles northwest of Concord, is working a force of about fifteen men. The Bond marble quarry is also in operation.

Mr. S. A. Rodgers, of Concord, is working the E. J. Craig & Co. marble quarry near Friendsville, Blount county. Mr. A. A. Woods is "boss" of the Cedar Bluff quarry, which until recently employed from thirty to forty men. On account of bad roads it is impossible for this quarry at present to haul their marble to a railroad point for shipment.

TROUBLE IN THE CEMENT TRADE.

THE Western Cement Association, headquarters Louisville, Ky., has started a cement war. Its object is to crush the independent companies, and the fight is said to be to the bitter end. Mr. J. B. Speed, president of the association, ordered a cut of 5 cents per barrel on cement, and this will be followed by another cut as soon as necessary.

The war will affect all the markets in the central part of the country. The association embraces thirteen cement mills. Of those J. B. Speed & Co. own three, and W. B. Belknap & Co. three. The others are in various parts of the west.

Of the mills composing the association, Speed's and Belknap's produce over 70 per cent of the agreed output. The others have the following as their quota: Clark county mills, 5.38 per cent; K. & I., 5.34 per cent; United States, 3.60 per cent; Gheens, 3.90 per cent; Ohio Valley, 3.80 per cent; Charlestown, 4.18 per cent; New Albany, 3.80 per cent.

The policy of those who control the association has been to refuse ad-

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[illegible] the independent mills and when the others admit them the big [illegible] will have to surrender part [illegible]

Last year there were [illegible] barrels made by the Western Association, and [illegible] the seven small members the product one named. If a new mill [illegible] the association it gets the right to manufacture one eighth of the [illegible] barrels.

It is interesting to note that a reduction of 5 cents per barrel on the barrels [illegible] would mean a sacrifice of about $60,000, and the [illegible] would [illegible] several of the smaller members of the association as they are not able to stand the reduction, the cost of product being comparatively now a greater to them than to those producing the best grade of it. The mill which produces 10,000 barrels costs the owner more per barrel than the larger producer has to pay, and every cent of reduction of the price on each barrel is a more rapid decrease of his profits.

It is current rumor that the war was started because the independent mills had been steadily getting [illegible] some months past. They assert that the war has not been started, and that the price of cement will be reduced to almost nothing. Most of the mills have good stocks on hand, and are ready for a fight. The price will range from 40 to 60 cents per barrel at present according to the market.

GRANITE TELEGRAPH POLES IN SWITZERLAND

While traveling in Switzerland last summer, says Charles H. Sweet, in the Engineering News, I came across an interesting [illegible] of a telegraph line in the mountains. The mountains [illegible] with which starts the west side of Lake Maggiore and connects Milan with Switzerland by way of the Simplon Pass. The [illegible] poles are of [illegible] granite. They average perhaps ten inches square and twelve feet high. I was told by a telegraph [illegible] that [illegible] were a number of stages of the [illegible] I was also told that the cost of the poles in place was about ten francs or $2, each [illegible] which would be more than the [illegible]. The poles are from [illegible] were cut are located at the [illegible] Simplon. They are [illegible] of more or less [illegible]. I noticed when seeing them large [illegible] really [illegible] to a [illegible] [illegible] to the [illegible] States. My informant [illegible] a telegraph [illegible] the [illegible] were made in Milan the [illegible] [illegible] the other [illegible] that they did not want [illegible] [illegible] [illegible]

FIRST MEETING OF THE EPITAPH CLUB.



EPITAPHS are not the sole desire of the members of the Epitaph Club. They are seeking quaint inscriptions of every sort.

The Epitaph Club was organized last fall by a crowd of clever folk who live near the north end of Lincoln park. When the members assembled for their first meeting things lagged a little. There was no apparent reason for this. They were all young enough to be jovial and old enough to be sensible. They were nearly all friends of several years' standing, and congenial in every way. But for some unknown reason no spirit was roused to suggest any means of fun for the first hour, and the plan for a series of social gatherings without any definite purpose seemed rather fragile.

Drury remarked in a half-whisper that the affair reminded him of nothing so much as a promenade party which he once attended in the catacombs. Drury could say this without being blasted, because the meeting was being held at the house of his sister Agnes, who had been married a few weeks before to his best chum. Inasmuch as Drury had been a potent influence in placating his parents when the engagement was first suggested, he was a highly privileged person in the shade of the new household.



STROLL IN THE CATACOMBS.

Drury's remark was not very bright, but it is worth quoting here as the inception of a conversation which resulted in the form which the club assumed. As he said afterward, one word led to another, and that one led back at the first with its right, and the first got in an uppercut and the thing was done. The organization was to be called the Epitaph Club. It was made incumbent on every member to devote his antiquarian researches to the finding of quaint and curious epitaphs. Anthologies of wit were to be ransacked. Cemeteries were to be visited. Those who had traveled and knew the churchyards of the old world were to refresh their memories. Traditional tombstone lore of the western frontier, such as used to be printed in the newpapers of rival county seats to cast discredit on their neighbors, were to be welcomed. Finally a rule of the club declared that every member should come to each meeting prepared to quote for the pleasure of his fellows one old or curious epitaph which

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approval. I trust it will be many a year before there is occasion to use it. Still, who can tell?"

Then, with tears in his voice, Drury read to the admiring members this fragment from his own works—the first fragment, by the way:

"Here lies what's left of William Ewing—
A victim of incessant chewing.
He ate all day, he ate all night;
He ate up everything in sight;
Till death came by and cooked his goose,
And he died for the want of gastric juice."

Ewing wanted to dissolve the organization at once, but he was finally pacified, and the scope of the club was extended to include quaint verses and inscriptions of every sort, so the field for research might not be so limited in the future.—Geo. Ade, in Chicago Record.

THE CUTTING CONTENTION IN CHICAGO.

A CURIOUS demand has been made upon the treasury department at Washington in the alleged interest of stonecutters at Chicago; and a still more curious response is reported to have been made. It is one of those cases where authorship cannot be located but where influence is seen to exist—often to the effecting of very astonishing results. "Someone," then, has demanded that the treasury department, in preparing material for the new federal building at Chicago, shall cause all the stone-cutting to be done in the city instead of at the quarries where the stone is obtained. Of course this involves a vastly increased expense for freight, added to the perfectly useless transportation both to and from the grounds, of those portions of the rock that shall be dressed away. True, it means at least a chance at work, and this under circumstances which would enable the closely organized unions to more nearly secure control than they could hope to do if the immense supply required should be cut at the quarries. Further, much of the stone will of necessity come from beyond the limits of the state, since granites and marbles are not produced here.

The still more curious response is a suggestion, accredited to attaches of the treasury department, that the Chicago stonecutters induced contractors to bid on undressed stone alone, thus compelling the government to yield the desired point. The whole affair is reported in the daily press with a frankness so perfect that the conspiracy seems entirely overlooked.

"STONE is always most interesting to us. We have no doubt it will be as much so in 1898 as it has in 1897. We wish for its continued success, and we know it will succeed if it keeps up to the standard of the years past."—*Verde-Antique Marble Company, Victor, Cal.*

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GOVERNMENTAL MATTERS AFFECTING MARBLE TRADE.

cubic foot, according to actual measurement, are sustained, and the collector's decision is reversed in each case, with instructions to reliquidate the entry accordingly.

General Appraiser Tichenor has rendered the following opinion in the protest of Mandel Bros. against the decision of the collector of customs at Chicago, as to duties on certain manufactures of marble, alabaster and metal (statuary) imported by said Mandel. General Appraiser Tichenor's opinion reads:

We find—

(1) That the articles in question consist of busts, single figures and groups, in marble, alabaster and bronze, varying in height from about one to three feet, and in various value from 38 to 300 lire or francs, with discounts variously of 3, 5, 10 and 2 per cent and of 20, 5 and 3 per cent, representing "Venus de Milo," "Romeo," "Margherita," "Cupid and Psyche," "Diana," "Pandora," "Hebe," "Aurora," "Night," "Napoleon I.," "Three Graces," "The Dancers," "Message of Love," "Daughter of Eve," "Tanagra," "Melodie," "The Wave," "Confidence," "Couvre feu," "Salvator Rosa," "Incredulous," "Chaperon," and other familiar subjects.

(2) That these articles are not the handiwork of a professional statuary or sculptor, who conceived the designs and executed the clay models or originals, nor are they replicas or copies thereof executed by him or under his immediate attention or supervision, nor copies similarly executed from the original productions of other artists, but are copies of reproductions executed by artisans or amateurs in industrial establishments, being of a class usually kept in stock by manufacturers and dealers for sale at ist prices, with varying discounts, according to size, design, quality or finish, etc., and are of the same general character as those which were the subject of G. A. 3427 and 3515.

The aticles were assessed for duty at 45 per cent. and 35 per cent. ad valorem, respectively, under paragraph 105 and 177, act of August 28, 1894, and are claimed to be entitled to free admission under the provisions of paragraph 575 of said act.

The invoices are accompanied by the so-called "artists' certificates," in the usual stereotyped form, to the effect that the maker thereof solemnly and truly declares that he is a professional sculptor; that the articles were executed by him, to be forwarded to Chicago to be entered as the production of a foreign artist. These documents bear the usual consular "certificate of identity."

These "certificates" are as devoid of solemnity and legal responsibility, so far as the maker is concerned, as the usual so-called oaths or declarations respecting the nature and value of merchandise generally in invoices from continental Europe. The names of the objects themselves contradict the statement in the certificate that they are the original conception or design of the person making the declaration, while their low invoice price and the discounts abundantly show that they are the output of industrial establishments. It is matter of common knowledge that a number of the subjects mentioned were designed by artists not now living, and that few, if any of them, were actually designed by the persons making the "certificates."

In Merritt vs. Tiffany (132 U. S., 167) the Supreme Court held in effect that reproductions in bronze by Barbedienne and David, the most celebrated bronze founders in Europe of certain well-known works designed by statuaries or sculptors, including "Penelope," Madeline," "Retour des Champs," "Venus de Milo," "Mercury," "Delila" and "David Before the Combat" were not professional productions of a statuary or sculptor only.

It was the concensus of opinion, unhesitatingly expressed, of five distinguished professional sculptors who appeared before the Board, that the articles in question, according to the invoice description and price, were not the professional production

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[illegible] MATTERS AFFECTING THE STONE TRADE.

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Representative Barham has introduced a bill into the House providing for the establishment of an executive department of mines and mining.

Representative Gibson is the author of a bill which provides that all coal or marble, etc., mined, quarried, or in any way handled by convicts, must be, when transported from one State to another, placed in cars plainly labeled "Handled by convicts at ———;" the bill also provides that all such marble, etc., shall be subject to the law of the State into which it is transported after having been so handled; if the regulations of the bill are not observed, the commodity to be forfeit to either the state in which the law was violated, or to the United States.

[Regular Correspondence STONE.]

NOTES FROM ABERDEEN.

The government blue-book, as to the mineral industry of the United Kingdom, for 1896, only just issued, gives the total number of persons employed in or about quarries, as 112,829. Of these, 1,912 persons were employed at quarries in Aberdeenshire. In Scotland there were thirteen deaths from accidents inside and outside quarries under the Quarries Act—i. e., those not under twenty feet in depth. The quarry output in Scotland was 691,872 tons basalt, 393,841 tons clay, 474,826 tons granite, 177,948 tons sand, 234,073 tons limestone, 1,352,086 tons sandstone and 37,276 tons slate. Aberdeenshire produced about three-fourths (viz., 348,878 tons) of the total output of Scotch granite. The estimated total output of granite in the United Kingdom during the year 1896 amounted to 1,756,816 tons. Of this quantity Leicestershire produced about half (the granite there, however, being suitable for little else than paving purposes) and Aberdeenshire about one-fifth. In Scotland sandstone is largely got in the counties of Lanark, Forfar, Fife, Edinburgh, Dumfries and Elgin. Large quantities of limestone are produced in the counties of Edinburgh and Banff.

In the recent Christmas week the extensive dissolution sale of the effects of Messrs. J. Whitehead & Sons, The Granite Works, Aberdeen, took place, total estimated value being £10,000. The firm's large works in Aberdeen are to be discontinued in a few months and the ground fenced out for house-building. Most of the machinery was bought by Aberdeen granite manufacturers, and the business, which would otherwise have fallen to the firm, will, in due course, practically be divided among the other works in Aberdeen.

Three new granite quarries were opened in Aberdeenshire last year, or, to be strictly accurate, one old quarry was restarted and two new ones opened.

The Australian branch of the monumental trade here has revived, and all the granite merchants in Aberdeen, in their reports for last year, anticipate a great increase in the architectural trade and the demand for polished and ornamental building fronts and interiors for English towns is growing daily.

The New Year holidays are now over, and in most cases in this city seem to have lasted a day or two longer than usual, but business in all the departments of the granite trade, favored by good weather, has opened well. Last year the local quarries had a splendid demand for building stone, chiefly for Aberdeen, where plans of dwelling houses—all substantial buildings of granite—capable of accommodating about 8,000 people, were sanctioned by the Municipal Corporation during the year. This represents the biggest percentage of increase in population of any of the principal Scotch cities, and is, of course, irrespective of the large number of warehouses, factories, public and miscellaneous buildings erected. HEATHERBLOW.

Aberdeen, Scotland.

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A FEW THINGS TO BE REMEMBERED IN BUILDING GOOD ROADS

WITH the increased demand for what is popularly known as good roads, whether the demand comes from the country or city, the subject of providing good drainage for the roadbed, and having the land well prepared, becomes very essential, as much so perhaps as having the base put in with a great deal of care. These matters generally do not receive the attention they deserve. Too many people seem to think that anything that is to be covered up does not need attention, that the roadbed is unimportant, and that the base is the thing. The authorities seem to doubt whether it pays to put as much money into it as they do. What they want is to spread out the money so that a few miles of their constituents may think that when the day of reckoning comes they can get to a great deal apparently done with little money. But as the day of reckoning comes all too soon. Whether the taxpayer and the user had these questions before them, attention to the roadbed would be given.

[illegible] first that the preparation necessary for permanent country roads [illegible] other materials [illegible] in road construction. The first thing to do, in the case of a wet roadbed, is to [illegible] length of the road, and taking [illegible] drainage at every available [illegible] good road. The average dreamer [illegible] careful [illegible] the [illegible] and [illegible] the [illegible] care [illegible] grades [illegible] the [illegible] which [illegible] as [illegible] grades [illegible] the [illegible] grades [illegible]

[illegible] drainage [illegible] way [illegible] the [illegible] necessary [illegible] the [illegible] the [illegible] the

civil engineer, and not by some pretender, or some politician whose only ability lies in his "pull" with "the powers that be," and "be" for a short time only.

In excavating for the road-bed care should be exercised not to plow too deep or to one side of the outer lines of the proposed roadway; if there are depressions in the sub-grade there will be a tendency to make chuck holes in the road after a little time, owing to the water settling in the places where the dirt has been cut too deep. If the bed is cut too wide and filled back the road after a little will spread and become weak on the sides. Farmers' drain tile should be placed under the sub-grade of the roadway at any point where the earth seems to be springy, and the water led to one side of the road, even if a fill has to be made to get the desired drainage. The whole road-bed should be rolled with a heavy roller until it is thoroughly compacted. The amount of rolling and the size of the roller must depend upon local circumstances. The average soil when moist should compact about two inches, which, of course, needs to be taken into consideration when doing the grading. The depth and kind of material used for the roadway must depend in a great measure upon the locality, the traffic conditions and the material at hand—whether the road shall be constructed of trap, granite, quartzite, pebbles, cobbles, slag, lava, shells of various kinds, gravel, cinders, burnt clay-ballast, wood, brick or asphalt. Also, keep in mind the ability of the people to pay the taxed cost; and further, take into consideration that long-time bonds demand the payment of large amounts of interest.

In preparing a road-bed for a city street much the same mode is to be followed, except a sharp watch must be kept for old excavations made for various purposes in times past, such as sewer, water, gas and other ditches. Especial care must be taken to see that they are made solid, or else the pavement will be a failure.

At the present time concrete is used very extensively for a base, taking the place of a sand foundation.

Close attention must be paid to the materials entering into the mixture as well as the mixing and the care necessary to insure a good set. The thickness to be used must be determined by the traffic it has to sustain. Concrete, as usually made, is a mixture of cement, sand and stone, with enough water to mix the mass. The cement should be of a good quality of dry native hydraulic cement, and should stand tests equal to the leading brands. The fineness of cement is a very important factor. The whole batch tested should go through a No. 60 seive, and at least 85 per cent should go through a No. 100 seive. Samples should be taken from each car lot and made into briquettes, both neat and with sand, and after the initial et, kept under water in shallow pans, and every few days a certain number

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thus saving the cost of taking up the old material and laying new concrete, besides making a good sanitary street.

This article is intended to point out some of the more common faults in road-building as it appears to the writer after about fifteen years' of experience and observation in paving and road-making, and is written in the hopes that it may be the means of helping to smooth the way for man and beast, and to help the official whose intentions are of the best, but in whose pathway are many pitfalls which do not appear to him until in after years. The old adage is true in road-building as well as in everything else, "If a thing is worth doing at all, it is worth doing well."

William H. Barnes,
City Engineer, Topeka, Kan.

MODERN APPLIANCES IN QUARRIES.

THE huge beds of stone upon which the two magnificent palaces of the Champs Elysees are to be erected, begin to make their appearance above ground. These two buildings will border the "Grande Perspective Nicolas II." at the Universal Exhibition of 1900. How will it be possible to construct so speedily these imposing monuments destined to remain after the exhibition among the architectural beauties of Paris? We can readily understand how the architects, men of undoubted talent tested by numerous competitions, to whom the work was entrusted, imagined, studied and planned these palaces with marvellous rapidity; but the materials themselves, the stones which form the bulk of the work, how can they be obtained in time, drawn in huge block from the quarries? Here is a very interesting object lesson, in which is revealed the power given to human labor by mechanics with its admirable utilization of forces. It is by the cutting, transport and piling of huge blocks that the successive stages of civilization have marked the extent of their grandeur. Are not the obelisks and pyramids a cause of admiration and wonder even to people of the present day? How was it possible for pure manual labor, even when carefully distributed, disciplined, subjugated, to hew those gigantic stones and then move them into their final resting-place? Important works have been written on this subject, from which it appears that the inclined plane and the wedge no less than patience and length of time contributed to remove these difficulties. But fundamental documents are too frequently denied to seekers; perhaps they were lost, to our deep regret, in the famous and silly destruction by fire of the famous Library of Alexandria. The present generation has consequently been obliged to begin all over again. Very fortunately, steam and electricity have given it perfectly new means of action of such power as to be able to rival the buried secrets of ancient engineers.

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A striking example is furnished in the working of quarries where electricity is now co-operating with the steam, with advantage of power of great value. Work must be smart in the cutting of a bed of stone in quarries. The architect who has ordered the ashlar and arch stones is always in a remarkable hurry. Besides one has to work in the open air amid the dust in fine weather and under the pelting rain in bad. The steam engines scattered about the quarry were often injured by such a state of things, they became sluggish, suffering from a kind of engine rheumatism affected by successive condensations, a kink of pulmonary apoplexy and uttering heart rending groans and however stone rending.

With the giant electric conductors all these inconveniences vanish in many cases. In the great quarries of Euville for example for the work of extraction the machines which cut the stones are electric, the work yards are lighted by electricity and water is raised by this same means to a height of 8 metres to feed the boiler of the little steam motor which is situated at the end of the big rolling bridge and traverses the stones through space. From an already long experiment it is estimated that a great economy is thus obtained.

In the quarries of Hainault also famous there is a running bridge of enormous power which raises the biggest blocks. It is worked by steam but is animated by electricity and served continuously by pumps, winches and electric cranes. The annual production of a quarry exploited in this way is estimated at 4,000 cubic metres of granite. We may also mention the instructive case of the Savonnières quarries. Where horses and operatives were employed for the various machines situated in different parts of the work yards which are about 50 hectares in area the consumption of coal was 6 to 8 kilogrammes per effective horse power. Now a single motor electricity the consumption of coal is below one kilogramme per horse power. It is a result not to be despised and which demonstrates the economy of driving motive power. Let us add that thanks to these power machines the time required for extraction and therefore, almost has been greatly reduced. In fact, a big monument, a case of imposing colonnade or any kind was had to remain, 6 months in extraction without engines, might be executed in the stone and receive its final polish. The time of driving is also at the same with the new rapid methods of extraction by electricity. It is, to a great degree to give a stone which for months has been subjected to the inclemencies of the weather and that which is removed and placed in the shelter in a few days.

It is to this powerful and improved extracting plant that the Exhibition of 1900 being now prepared on a scale of incomparable grandeur will be indebted for the sudden appearance of its palaces above ground rising

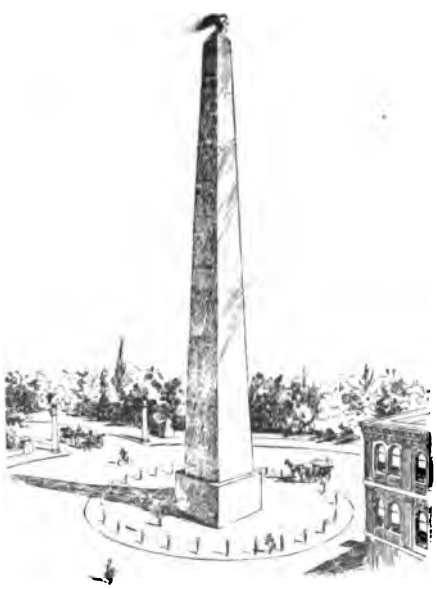
to mind the mythological legend of Orpheus charming the animals, rocks, trees; etc.

In fact, we here find a reply to the question made by Henri Heine: "Had not nature formerly a sensibility similar to that of man and perhaps more? The inspiring power of Orpheus, we are told, led away trees and rocks in a dance. Is such a prodigy possible at the present day?" If Henri Heine were conducted by one of the architects of our future Exhibition through the yards where the marvelous work is being executed he would no doubt exclaim, all poetical skepticism conquered, "The prodigy has happened."—La vie Scientifique.

SYDNEY'S SCENT BOTTLE.

THE strangest monument in the world exists in Sydney, Australia. The shaft itself is not of an unusual sort, but while it is a unique ornament to the community in the midst of which it stands, it is also the most precious and the least understood of all structures in the great southern city.

This odd spire has no inscription upon it. It is as plain as a monolith, with a plinth and a slightly elevated pedestal. Facetious people, who are not versed in sewerage and sewer gas, call it the "Scent bottle." Strangers scan it, strain at its unlettered faces, carry their vision up its plain sides to the pinnacle, which stands about 180 feet above the street level, and wonder what notable person or event it commemorates. Three-fourths of the people of Sydney have not the remotest idea of what this modified Cleopatra's needle represents. This "scent bottle" commemorates sewer gas, and it stands as a monument to the people who are not killed by that vile subterranean agency.



THE "SCENT BOTTLE," SYDNEY, N. S. W.

As it has no other name, "scent bottle" will serve with which to designate it here, since the nickname somewhat symbolizes its business. This lonely column stands on Elizabeth street, in a small circle, against Hyde Park. Around it are a cordon of low, round-headed iron posts at short dis-

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[illegible] and chained to each other by strong traces upon which the para[illegible] and small boys lounge. None of these thousands of people ever think that the tall spire in the unique circle is the safest friend they and the[illegible] have. Take it away, close the eighteen foot square hole and in less than twenty four hours the whole country about would be strewn with sewerage and the air filled with foul pestiferous gases. Remove it and wave[illegible] again then in less than a day the sewers would be quiet[illegible]. The great sewers of the city have their ventilators. These cover[illegible] with their fresh and deadly gases throw the latter off through the[illegible] in the manner and carry the remaining sewage gases out to[illegible] Hawksley's ventilators in the sea.

The event[illegible] over the meeting of the waters and[illegible] gases in the burdened[illegible] Its[illegible] at the[illegible] which a[illegible] to the eye upon the street. [illegible] great[illegible] at the[illegible] sewers[illegible] The[illegible] long[illegible] gases[illegible] and the[illegible] gases[illegible] [illegible] [illegible] [

is by no means measured by the sums paid out to the poor people whom accident has thrown out of work. In a recent report to the state department Consul Monaghan, of Chemnitz, Germany, says: "One of its greatest virtues is the influence it exerts as a preventive of all kinds of accidents. It does this, I might say, directly, inasmuch as the eagerness to avoid payments causes manufacturers and employers of labor to put forth the very best protective measures in their works and on their machines. Thus, it aids in minimizing the number and character of accidents. At a time, too, when all kinds of labor are being performed by or on complicated machines. This factor is one well worth while considering. In the accident-insurance system, the claim is made, and I have not seen it successfully denied, that the employers pay the huge sums that are annually distributed. How large these amounts are, appears in the following table. The figures are for a period of eleven years. In that time, 300,000,000 marks ($71,400,000) were paid out as follows:

Year.	Amount.		Year.	Amount.	
	Marks.			*Marks.*	
1886	1,900,000	$452,000	1892	32,300,000	$7,687,400
1887	5,900,000	1,404,200	1893	38,100,000	9,067,400
1888	9,700,000	2,308,600	1894	44,300,000	10,543,400
1889	14,500,000	3,451,000	1895	50,200,000	11,947,600
1890	20,300,000	4,831,400	1896	57,100,000	13,589,800
1891	26,400,000	6,283,200			

"These huge and constantly increasing sums go to the wounded workmen or to their families. If the sums paid for administration, boards of arbitration, and reserve funds are added, the total runs up to 492,000,000 marks ($117,096,000), distributed over the years mentioned as follows:

Year.	Amount.		Year.	Amount.	
	Marks.			*Marks*	
1886	10,500,000	$2,499,900	1892	52,600,000	12,518,800
1887	19,700,000	4,688,600	1893	58,800,000	13,994,600
1888	26,900,000	6,402,200	1894	64,000,000	15,232,000
1889	33,200,000	7,901,600	1895	68,400,000	16,279,200
1890	38,200,000	9,091,600	1896	73,200,000	17,421,600
1891	46,700,000	11,114,600			

"In other words, the workmen wounded by accident in this Empire have been paid in eleven years, over and above their wages, almost 500,000,000 marks, or nearly $120,000,000. How successful such a system would be with us or among other people it is hard to say. Its success here is certain. The socialists, however, are far from satisfied, since, as they say, all pensions, insurance moneys, etc., are paid ultimately out of the earnings of labor."

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A PRACTICAL QUARRYWOMAN



AMONG our list of quarry owners and operators will be found a few well-known names of women who either manage the office work of a quarry business or are directors of quarrying companies. There are a few who are the active practical managers and superintendents of quarrying operations. Strange as it may seem, quarrywomen who do active outdoor work and know the practical side of the business as well as men have been found to undertake this task that an unmarried man would not undertake, thus demonstrating themselves worthy helpmates and wives to men.

It is a pleasure to introduce to the fraternity of quarrymen a woman who has a record more than an ordinary one in the quarrying and contracting and who has [illegible] enterprise.

Mrs. M. [illegible] manages the [illegible] quarries located at [illegible] N. Y. Mrs. [illegible] maiden name was [illegible] and she was born in Watertown, N. Y. Mrs. Watertown, N. Y. Her father, Hon. [illegible], was well known in northern New York as a prominent business man. He was one of the [illegible] and was for several years [illegible]. He was also [illegible] and was a [illegible]. It was very natural that [illegible] should be interested in quarrying. When [illegible] Mrs. [illegible] was a young girl, [illegible] Watertown was [illegible] was a [illegible]. However, [illegible] had a [illegible] and [illegible] getting [illegible] [illegible] [illegible]

the present time the quarry is open for a distance of 300 feet long and 85 feet wide, with a face of 15 feet.

Mrs. Faulkner is a most remarkable business woman, and when questioned as to the work she said she was just in her element when the weather was fine and the work was being pushed to the utmost. When asked if the work tired her she smiled and said: "No, I am never tired, and do not know what it is to have an ache or a pain, and if more women would occupy themselves with real serious work there would be less grumbling and less unhappiness in the world."

Added to the responsibility of working the quarry is the care of two large boarding houses, where the quarrymen are accommodated. Many of the teamsters keep their horses on the farm, which also requires added attention. Mrs. Faulkner has had entire charge of the men, and depends upon herself alone. She has superintended the entire work of hiring and discharging the men according to her judgment, and has throughout exhibited rare ability and excellent foresight. A few weeks since she made application for a charter to construct a railway from the quarries to the canal, nearly two miles distant. She has also recently contracted with a prominent asphalt paving company, which has a contract for a section of the canal improvement, to furnish 30,000 cubic yards of stone.

WESTERN STONE COMPANY SHOWS NET PROFIT.

THE annual meeting of the Western Stone Company was held January 19 in Chicago. The following directors were elected, among whom William B. Walker succeeds Bryan Lathrop: Messrs. Madden and Munroe were re-elected as president and vice-president; C. L. Hutchinson, C. H. Wacker, M. B. Madden, A. M. Day, J. L. Norton, J. H. Dwight, G. H. Munroe, L. C. Huck, C. B. Kimbell, H. H. Getty and W. B. Walker.

Receipts from all sources for the year were $398,275.17, and disbursements, including $31,240 interest on bonded and mortgaged debt, were $394,545.51, leaving $3,729.66 profit. President Madden in his report said:

This has been a year of serious disappointment to those engaged in the production, manufacture and sale of building materials. The building trades and their kindred branches have suffered severely during the year 1897. Few buildings of importance have been erected. Capital has been idle; labor unemployed. The volume of business has reached its lowest ebb. Prices have been lower than at any time in twenty years.

The struggle with every one in the line to make both ends meet has been constant. Fortunately, this company has succeeded in doing so. Notwithstanding the general and extraordinary depression, it closes the year with a small profit.

That the bottom has been reached there can be no doubt. The tendency must henceforth be upward. Renewed activity is already apparent. A better feeling prevails. New projects are being pushed. The outlook is brighter than it has been for four years.

The working machinery has been maintained in its usual high state of perfection.

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THE LARGEST MARBLE COLUMNS IN ANY BUILDING IN AMERICA.

THE monolithic columns now being cut for the new court house in course of construction at Baltimore are 31′ 2⅝″ high, exclusive of base and capital; diameter at base 4′ 2¼″, at the top 3′ 5½″, with flutes, bands and mouldings, top and bottom, and are without doubt the largest marble monolithic shafts in the United States. They are purely Ionic, and have richly moulded and carved bases and capitals, as shown in accompanying sketch. The entasis is drawn according to the usual methods employed by the ancient Romans. The diameters for about one-third of the length vary but little, while for the remaining length the beautiful swell can be readily seen.

When quarried each stone weighed about eighty-nine tons, and as the block was separate from the main ledge it contained two columns, making a mass of about 180 tons; the size of these monster shafts can hardly be understood or appreciated unless seen. There are eight required in all; five are now in process of cutting, three being almost finished. They were scabbled or roughed out at the quarry and then shipped on a specially built car to Baltimore, where it required twenty-five teams and two trucks, weighing about ten tons each, to convey same to the site of the new court house, where the cutting is being done in a shop specially designed for the purpose, lighted by electricity and supplied with hot water for rubbing and finishing.

Each column rests on a device perfected by Mr. R. S. Sandlass, of the Campbell & Zell Company, Baltimore, consisting of iron castings and pulleys bearing on double pins, which enables the men to turn the columns with two levers about four feet long, applied to end of pins. This method of handling columns cheapens the production and confines them in a much smaller space.

The contractors have employed to superintend the cutting of these columns Mr. James H. Young, formerly secretary of Tuckahoe (N. Y.) Marble Company. He has under his charge stone-cutters from Baltimore and other cities, and the workmanship displayed shows that exceeding care was exercised throughout. Each piece in their selection was sent to the shop in rough circular form, and to put on a correct bed required experience and intelligence. Not one defect in the cutting can be seen, and

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when completed and accepted after close inspection they will reflect credit on all engaged.

The marble is from the quarries of the well-known Beaver Dam Marble Company at Cockeysville, Md., and is a fine sample of the quality and quantity that can be produced in Maryland. When we estimate that one cutter would be kept busy for about eight months on each stone to complete same, and that scarcely seventy days have elapsed since the first bed was put on any of them, we can easily see that the contractors have shown unusual diligence in their execution.

The accompanying sketch was furnished the Stone-Cutter' Journal by Mr. John Knox, the engineer employed at the office of the contractors, and will be readily understood by practical stone-cutters everywhere, and to the Journal we are indebted for the use of it.

The architects of this fine building are Messrs. Wyatt & Nolting, of Baltimore. Messrs. John Gill & Sons and David W. Thomas are the contractors.

MOUNTAINS OF BITUMINOUS SAND ROCK.

GREAT wonders of nature, like prophets, are seldom appreciated in their own region. A marked exception to this rule are the mountains of bituminous sand rock which have given the mountains of Santa Cruz, Cal., a unique place in the literature of geology. Overlooking the Bay of Monterey, they are near to transportation both by sea and rail. It is here that the most extensive mines of bituminous rock known to commerce are located. Conservative estimates based upon the rock now in sight have allotted to these mines a productive life of from eighty to a hundred years at the rate of an annual output of 25,000 tons. San Francisco and neighboring cities are showing their appreciation of this vast treasure, which, if continued, will exhaust these mines in less than fifty years. San Francisco has for ten years easily held a place in the front rank of the world's cities as a user of bituminous rock pavements.

STONE ARCHES OF LARGE SPAN WITH ARTICULATED JOINTS OF LEAD.

IN 1885 to 1891, says M. Humbert in the Annales des Ponts et Chaussees, for the third quarter of 1897, M. Liebbrand, Director of Roads and Navigable ways, in Wurtemburg, built a number of masonry highway arched bridges, which presented some interesting peculiarities of construction. The first masonry arched bridge of the Wurtemburg series was built in 1882 upon French methods. It had a span of 108.24 feet, with a circular arch 5.25 feet thick at the spring and 3.28 feet thick at the crown. Not-

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[illegible] warning the precaution taken and the use of [illegible] cement the [illegible] swear the springing line began to show a little cracks through the [illegible] and [illegible] until forty-two days after the setting of the key [illegible] engineer had the ring never to attempt the experiment [illegible] and [illegible] at the key and at the points of rupture [illegible] arranged as to permit the arch to freely take its own bearing during construction and upon [illegible] centres. Levers were to be made to the interior [illegible] [illegible] about a [illegible] of the [illegible] and [illegible] the [illegible] the other two [illegible] remaining empty. [illegible] was to at the head were [illegible] to a pressure equalling the [illegible] of the metal in the [illegible] and spread out [illegible] and [illegible] would increase until the [illegible] pressure was [illegible] a [illegible] at the [illegible]

[illegible] were then made upon the resistance [illegible] [illegible] [illegible]

masonry bridges thus built, between 1885 and 1891. The spans range from 51.2 to 108 ft. They all show a lowering of the crown when the centers were removed, ranging from 18 mm. for the 51.2 ft. span to 163 mm. for the 108 ft. span. Six of these bridges were built of stone, and at the points of rupture plates of lead 0.86 in. thick and of a width varying with the span were put between the voussoirs for the whole width of the bridge. At the summit of the arch two leaden joints were used, equidistant from the axis.

The employment of these leaden joints, says the author, was advantageous in passing the line of pressure through the three points of articulation, as the thickness of the arch was reduced to the resistance of the materials employed. The general result was economical.

The seventh arch, of 59 ft. span, was for a railway bridge at Ehingen, and was built in beton. The body of the arch was made of beton, of 1 cement, 2 sand and 6 gravel, and in this beton rough stone blocks were imbedded. At the points of rupture and at the key two rows of stone voussoirs were introduced, and between these were placed sheets of lead 0.86 in. thick. The plates of lead, which in the first arches had a width of one-third of the joint, in more recent work have been reduced in width to one-sixth of the joint. At the Forbach arch the pressure upon a plate of this latter width has almost equalled 102 atmospheres, without any apparent injurious effect upon the lead or upon the voussoirs.

RESPONSIBILITY OF THE ARCHITECT.

THE Supreme Court of Maine recently ruled that the responsibility resting on an architect is essentially the same as that which rests upon the lawyer to his client, or upon the physician to his patient, or which rests upon anyone to another where such person pretends to possess some skill and ability in some special employment and offers his services to the public on account of his fitness to act in the line of business for which he may be employed. The undertaking of an architect implies that he possesses skill and ability, including taste, sufficient to enable him to perform the required services at least ordinarily and reasonably well; and that he will exercise and apply in the given case his skill and ability, his judgment and taste, reasonably and without neglect. But the undertaking does not imply or warrant a satisfactory result. It will be enough that any failure shall not be the fault of the architect. There is no implied promise that miscalculations may not occur. An error of judgment is not necessarily evidence of want of skill or care, for mistakes and miscalculations are incident to all the business of life.

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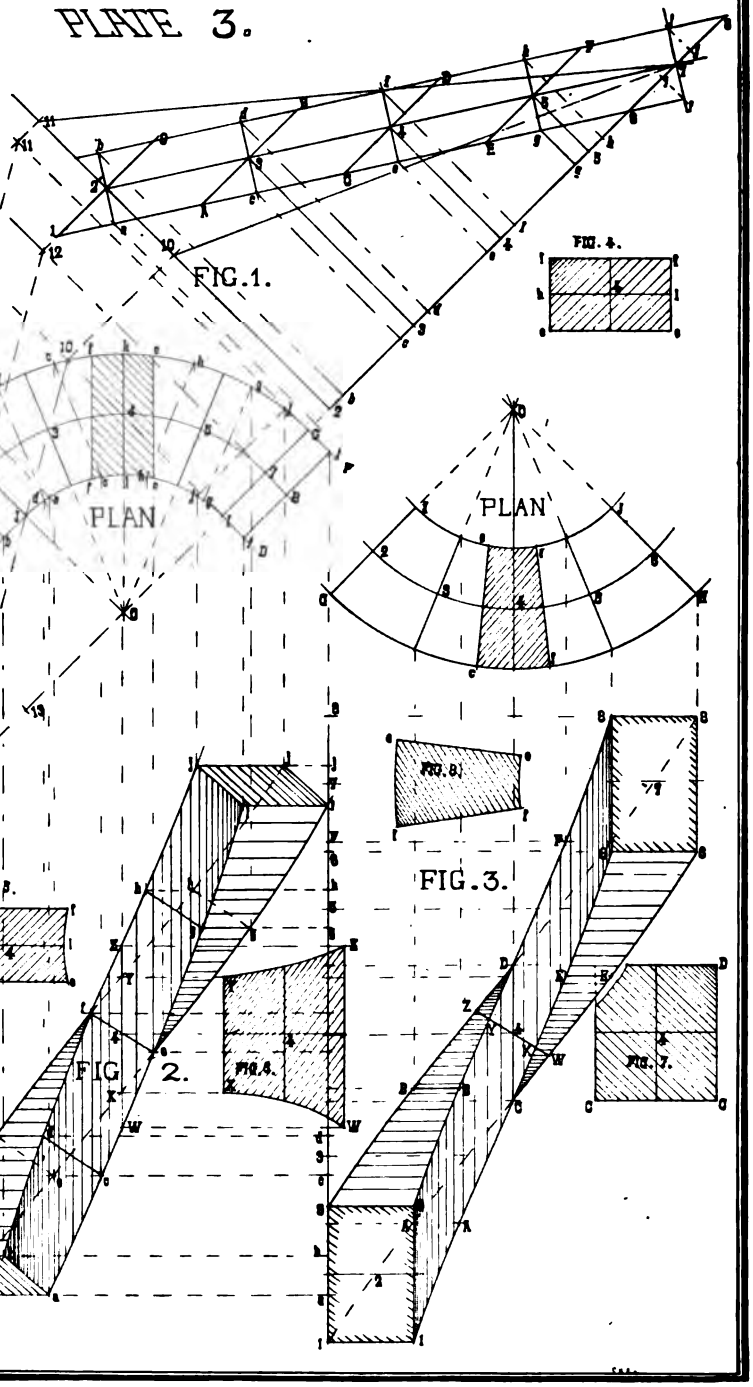
PRACTICAL STONE-CUTTING III

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PLATE 3.



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BREAKING OF QUARRIED STONE.



GEORGE B. ECKHARDT, of the Eckhardt Monumental Co., of Toledo, O , has hit upon a method of breaking granite and sandstone quarry blocks into required sizes, that is both novel and economical. He demonstrates that by making two breaks on a block at the same time, the block can be riven in a more accurate manner than any other way. Attention is called to the figures herewith, which in a sense explains the exact method without further description. In all his long experience in breaking after this plan, Mr. Eckhardt says he has never missed obtaining satisfactory results. Referring to Fig. 1: By cutting two sets of holes and driving two sets of wedges at the same time, care being taken to drive all wedges equally hard, the small piece can be taken from the center of the stone instead of from the end as is usually done, and which necessitates two operations on each stone. All quarrymen know that it is rarely the case that one can break across the grain much deeper than from the wedges to the end of the stone, and usually the break will run toward the small end, even if the wedges are farther from the end than the thickness of the stone; particularly is this the case if the break is nearer one end than the other.

Mr. Eckhardt says that in every case when he has tried his method he has been successful in getting both breaks to split almost, if not completely, arallel to each other. He has saved numerous bases and markers out of the blocks, that otherwise would have been considered waste. Not only that but much labor is saved that under the common way is applied to scabbling the pieces so broken apart. Granite or sandstone are broken by his method with equal success. Of course compact limestones or marbles may be operated on in the same way.

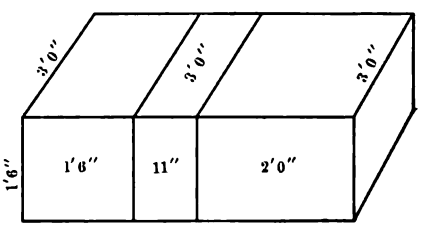


FIG. 1.

Granite pieces as small as 8"x1'6"x3'.0" have been taken out by this method. If a stone is wanted like that shown in Fig. 2 with the four faces of the stone on the grain, it can easily be taken out in this manner.

One more illustration (Fig. 3) will show what can be accomplished by this method of breaking stone blocks. The practical quarryman will at

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KNOWLEDGE IN THE ART OF BUILDING.

NOT always does the disinclination to seek advice upon points of detail spring from self conceit; frequently it is inspired by a much worthier motive. In the earnest effort to do his duty by a client an architect sometimes spends an enormous amount of labor, and time, over a personal study of details, he sees the great importance of these, and this cannot be overrated; but, conscientious as all his efforts may be, they must fall short of the success, which attends those put forward by the man who knows best where to obtain special knowledge. The man who has a general knowledge of all materials used in building must, and should, have a more varied store of information, within himself, than he who takes up the study of a single branch, or the manufacture of a single group of materials. But the latter, in many cases, will have a special knowledge of his own special work, which cannot possibly be obtained by one whose study has been of a more general character. Perhaps in no other branch of the modern art of building does an architect stand in need of special knowledge, as when he uses such intractable materials as marble and granite. It has often happened that the employment of these materials has been abandoned on the ground of expense, simply from a want of that knowledge which can alone be obtained from the specialist, who possesses a full knowledge of the most economical methods by which a desired effect can be produced.

Take, for instance, the matter of moldings: the particular form which these enrichments may take makes a comparatively slight difference to the total cost when the work has to be done in wood, or in one of the soft free-working stones. But it makes all the difference when one of the harder ornamental stones has to be employed. The effect again of a molding with a polished surface, projecting portions of which reflect a high light, is altogether different to the effect produced by the same molding worked in an unpolished material. Similarly the lines, and markings, of a highly polished material, are altogether different from those presented by the same material, dull polished, or rubbed smooth only. The particular thickness, to which a certain granite may be called for, frequently affects the cost altogether out of proportion to the cubical contents of the work: in some cases stone from a particular quarry comes out generally of a certain thickness, equal divisions of which can of course be more cheaply produced than any other dimensions. There is a constant influx of new materials into the market, and new methods of manufacture are continually being discovered.

A few years ago the manufacture of granite was revolutionized by the discovery that this material could be more easily shaped by revolving cutters than by being turned against fixed points. The discovery of the molding of the harder stones by means of abrasions, instead of cutting, has greatly cheapened the manufacture of these materials. But at present it is only a certain class of molding that can be produced by these means, al-

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MINERAL WOOL FROM LIMESTONE.

"SILICA fiber" is the name given to a product being manufactured by the Crystal Chemical Works, of Alexandria, Ind., from a hydrous limestone quarried in that neighborhood. The discoverer of the process is C. C. Hall, a chemist and mechanical engineer of experience in the management of steel works. The name given the product is expressive of its substitution for the purposes for which the commercial product known as mineral wool is adapted, and differs from most articles of that character in being entirely free of sulphur or metallic slag. It is said over 90 per cent. of its composition is the limestone material. This limestone, or cement rock, as it might more clearly be denominated, carries sufficient silica, alumina, lime and magnesia to form a fluid slag, when subjected to a temperature of about 3,500 degrees Fahrenheit. The other ingredients, which are the secrets of the invention, are employed to give the "fluid slag" the desired properties to enable it to be torn into fine shreds by the action of a high-pressure steam jet. No artificial, or refuse material enters into its composition, and no corrosive, destructive or unstable elements are absorbed in its manufacture. Air, moisture or heat are powerless to add to, take away from, or modify its composition; consequently there are no chemical changes to be expected that would form corrosive compounds and break up the fibers of the material, destroying the air spaces and causing shrinkage in volume. Most mineral wools made from furnace slag contain sulphur, and this is added to from the coke used in melting the slag. Sulphur, as is well known, is corrosive of all metallic substances, and its presence in mineral wool, it is claimed by Mr. Hall, tends to disintegrate its fiber and thus impair its value as an insulating material. It was these defects which started Mr. Hall to experimenting for a process in which crude materials absolutely free of sulphur could be employed under conditions and by agencies that would exclude all possibility of introducing it into the fluid matter. After many weeks of experimentation, and the building of several furnaces, it was successfully accomplished. The limestone, of which it is almost entirely composed, is used directly as it comes from the quarry. The process employs the use of two furnaces, one of which is kept at a low temperature and the other at a high temperature. The slag-making qualities of the stone were discovered by Mr. Hall during an analysis he was making to ascertain its value as a flux in steel making.

The manufacture of silica fiber has been carried on since the first of November last. It is white in color, light for its bulk, a cubic foot weighing when packed about eight pounds. It is soft to the touch, elastic, and warranted indestructible. A patent on it has been applied for.

"I like STONE and do not want to discontinue taking it."—*J. F. Norcross, East Longmeadow, Mass.*

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RIGHT OF ACTION FOR DAMAGES

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OUR FOREIGN TRADE IN STONES, ETC.

From the monthly summary of finance and commerce of the United States, corrected to January 7, 1898, we compile the following:

ARTICLES.	NOVEMBER.				11 MONTHS ENDING NOVEMBER—			
	1896		1897		1896		1897	
Imports—	Quan.	Values.	Quan.	Values.	Quan.	Values.	Quan.	Values
Cement (lbs.):		*Dollars*		*Dollars*		*Dollars*		*Dollars*
Imp. from—								
United Kingdom	19,021,147	61,891	8,810,282	28,396	243,818,515	780,339	118,741,425	387,449
Belgium	17,078,300	49,663	26,017,367	76,500	261,632,778	761,916	200,589,546	588,821
France	1,366,620	4,022	595,242	1,852	18,211,973	50,832	14,932,817	43,940
Germany	31,109,815	102,117	36,387,830	126,816	461,042,139	1,518,513	495,604,751	1,408,821
Other Europe	970,366	3,679	1,587,248	5,584	21,679,453	76,211	16,375,042	58,571
British North America	135,600	700	328,750	1,549	3,687,100	15,689	1,846,724	8,783
Other countries					1,221,600	5,652	411	1
Total	69,618,848	221,772	73,726,713	240,576	1,011,226,548	3,209,152	778,090,716	2,496,386
Marble, and mfrs. of		50,769		43,742		767,545		784,359
Stone, & manufactures of, including slate		26,356		20,357		364,224		244,696
Total		77,125		64,099		1,131,769		1,029 055
Exports—								
Marble and stone, and manufactures of:								
Unmanufactured		7,764		7,594		65,807		80,415
Manufactures of—								
Roofing slate		67,661		79,727		442,199		1,046,980
All other		41,619		32,881		528,170		410,151
Total		117,044		120,132		1,036,176		1,537,546
Cement.....bbls	1,873	3,812	3,965	7,144	50,163	79,494	51,168	88,816
Exports foreign mdse.								
Cement, Rom., Portland etc.....lbs	215,906	695	679,218	2,303	4,178,198	15,584	2,188,273	8,453
Marble, & mfrs. of		12		37		2,005		3,590
Stone, & mfrs. of including slate		884		191		9,501		10 806
Total		926		228		12,506		14,396

Merchandise Remaining in Warehouse on November 30, 1896 and 1897, Respectively.

ARTICLES.	October			
	1896.		1897.	
	Quantities.	Values.	Quantities.	Values.
Cement, Roman, Portland, etc.....lbs...	14,355,568	$ 42,091	3,606,428	$ 10,024
Marble and stone, and manufactures of:				
Marble, and manufactures of		33,103		20,737
Stone, and manufactures of, including slate		772		1,94
Total		33,875		22,686

BOSTON COURT GIVES A BLACK EYE TO LABOR.

JUDGE RICHARDSON, in the Superior Court at Boston, Mass., handed down a decision which is of immense importance to the labor world. In effect it is a tremendous black eye to organized labor. The case was a bill in equity brought by Lynch & Woodward, contractors, against Mayor Quincy and the city architects for an injunction to compel them to allow the contractors to finish work on a new public bath house on Dover street which they were building. The mayor had suspended the contract (at the request of the labor unions) on the ground that the contractors did not give the preference to union labor, as is recommended in all city contracts. He put policemen in the unfinished building to keep the contractors out. Judge Richardson grants the injunction, saying that "such discrimination in the employment of labor is not in accord with our ideas of equal rights and is hostile to that portion of the constitution of the United States that declares government to be instituted for the common good, and not for the profit, honor, or private interest of any one man or class of men."

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The Law and the Blacklist

S[illegible] has been [illegible]
formed and has [illegible]
[illegible] and [illegible]
[illegible] against the manner in
[illegible] [illegible] Manufacturers and Wholesale Grocers' Protective Association in New [illegible] and its black list. We write the [illegible] at first did not believe [illegible] was [illegible] by which [illegible] [illegible] case [illegible] [illegible] against the [illegible] [illegible] which [illegible] [illegible] The case [illegible] [illegible] [illegible]

were recorded on the list, and many of them are of good standing in a commercial sense, and have the same sort of action against members of the association as Mr. Weston had. The law of Massachusetts holds that everybody connected with the publication of a libel is equally responsible for damages, and perhaps we have not yet seen the final outcome of this case, and similar cases are likely to be brought against other members.

Organization in the Stone Trade. The quarry owners of Great Britain are moving toward the organization of a "quarry institute," or what we would call a quarry owners' national association. The movement will probably succeed, since the Britisher is always enthusiastic for organized effort in trade affairs. They come together over there in a different spirit than that which commonly rules among us. While in a sense they act upon the principle of "every fellow for himself," they don't shout hallelujahs if "the devil takes the hindmost" among them. When they come to an agreement they stick to it for all and singular that is for the common good. In that respect organization among them is quite different from organization in American industries. Numerous attempts have been made in this country to organize the stone industry. Quarrymen have taken into fellowship the contractors, and contractors have admitted the quarrymen, and both together have formed alliances with the journeymen, and while some local bodies still exist and are impregnable, such a thing as a sectional, or national organization of quarrymen or contractors does not exist. STONE has advocated national and district organization for each interest, and alliance of both for mutual benefit. Each industry has many things to reform that would conflict with the best interests of the other, and while this is true there are many matters that can only be bettered by mutual action. For instance, in the relations of employer and employed what affair is it of the quarryman how the contractor deals with it, or vice versa. Or, in the matter of quarrymen establishing a selling price on stone produced in a certain locality, what affair is it of the contractor further than to be sure that the price will be maintained without discrimination. But on matters affecting the use of stone, of its exploitation, of legislation, of insurance, of transportation, of progress in machinery, of architectural construction, of legal responsibility, and many other matters, the entire producing, manufacturing and contracting branches of the stone industry are directly interested.

We hope the project of our English friends will be successful, that it may serve to exemplify the good effects which a similar organization would have on this side.

Monumental Warfare. If this contention between artists and commissioners, over what is art and what isn't art in designs for public monuments is continued much longer, open warfare will surely ensue. This serious controversy is sometimes very amusing to people not directly interested. From the great monument at Indianapolis, probably the most majestic structure of the kind on the American continent, and to its close prototype, the Iowa state monument at Des Moines, and including St. Gauden's latest equestrian production, the Logan monument in Chicago, and the Cuyahoga county tribute at Cleveland, O., down to the commonplace memorials in nearly every

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Might be Misunderstood. A current item says The Vermont Marble Company, at Proctor, the largest corporation in Vermont, paid its employees $ [illegible] The market is brisk and means all the quarries are being worked to their [illegible]

Let us hope [illegible] Just [illegible] In the average monthly wage [illegible] the greatest number of employees in the country [illegible] It may represent the amount of cash [illegible] in a given week that also [illegible] paying for [illegible] wearing apparel, etc., etc., and with all the magnificent [illegible] generously provided by the country [illegible] at nominal rates. [illegible] the [illegible] Vermont [illegible] to the [illegible] [illegible] [illegible]

SELECTED MISCELLANY.

FOR A NATIONAL BOULEVARD.

WRITING on the subject of a great highway across the country, a correspondent of a Denver paper says: "The subject of a national boulevard has at various times been touched upon, not with much seriousness or hope of its being undertaken, but from lack of influence, enormous cost, and the old cry of 'paternalism,' which has been a political club used for years to block anything that would benefit the people at large. When considered from a business standpoint this same enterprise would be one of untold value to the masses, as well as the classes, and it certainly appears that the time is very near when something will be done in this matter. . . .

"This highway should be one hundred feet wide, covered with broken stone one foot thick, concreted thereon, and the right of way should include ten feet on either side, this space to be reserved for tree-planting. The starting point of this line should be Boston, thence west through southern New York, touching Cleveland, Indianapolis, St. Louis, Kansas City, Denver, Salt Lake and San Francisco. Its cost would be in the neighborhood of perhaps $200,000,000, but would be of vast benefit to the country on one question alone—from its influence in favor of good roads. . . .

"During the pleasant seasons of the year thousands would travel in every class of conveyance on such a boulevard, thus necessitating the establishment of hotels, livery stables, etc., at intervals to accommodate those demanding them. Besides the thousands of men required in construction and repair of such work, there would be many others employed in the states contiguous to this line in improving roadways leading into it, as well as the increased number in new buildings, additional bicycle, carriage and other manufactories. There would very likely be along this thoroughfare a government telegraph line, with offices at frequent intervals to accommodate travelers. . . .

"As this question is of utmost importance to bicycle and carriage makers, as well as labor generally, the combined influence is more than sufficient to induce prompt action on the part of our senators and representatives in congress, and could not be ignored without danger to their political aspirations."

EARLY ARCHITECTURE.

THE American student to whom the mysteries of architecture are made clear in Paris or New York forgets what was the former sanctity of his art. Mr. Herbert Spencer shows conclusively that the professional architect of thousands of years ago was the priest. Early architecture sprang from ancestral worship, and ancestral worship was the oldest of all beliefs. The graves of the departed had first to be preserved. The embellishment came afterward; thence the calling of the architect became sacred. The relic had to be preserved within an elaborate shrine. At first it might have been that the erection of a tomb called forth a certain amount of skill, and soon the temple followed the tomb. Mentuholtp's hieroglyphic inscription that "the chief architect was promoted and became a priest" shows the merging of the two callings.

"I am a great architect," says King Bekenhonsu, "and I was a holy father of Amon for twelve years." Sometimes the architect in Egypt was also a general. Herbert Spencer shows how any special skill among a primitive people was always supposed by them to be derived from some supernatural power. There

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[

rock wall of the drill hole, and, if water and oil are found in the gas rock, to keep them from flowing up from the lower end of the pipe. The general style of the many types of packers is the same. A hollow cylinder of rubber, smooth or ribbed on the outside, and as large as can be put in the well, is held above and below by a slip joint. When the tubing rests on the bottom of the well, the weight of its upper part forces the top flange upon the rubber, distending it against the sides of the well, and thus making a gas and water-tight joint.

At the surface end of the tubing three valves are placed and arranged so that the well may be blown out into the air, or shut off from the service main, which is also blown out from time to time. Before confining the gas by closing these valves, the tubing is anchored down by clamps and ties to the top of the 8-inch casing. In spite of every precaution, attempts to control the gas are often followed, where great pressures are encountered, by the lifting of the tubing casing and all from the ground. Instances are recorded of wells remaining uncontrolled for over a year.

The depth of the wells varies greatly in the different fields, the widest variations being in the Ohio and Pennsylvania districts, while in Indiana it is more uniform. The best wells in Indiana are about 1,000 feet deep, and, as a rule, tap the Trenton limestone less than 100 feet either way from sea level. In Pennsylvania and Ohio, wells are much deeper below sea level. A geological section of Indiana rocks along a line from Delta, O., to Terre Haute, Ind., passes through the most productive region.—Hosea Webster, in Cassier's Magazine for February.

WORK AT HIGH ALTITUDES.

LEADVILLE is the only town as high as 11,000 feet above the level of the sea in North America, while in the Peruvian and Bolivian Andes there are people who never in their lives came down to so low an altitude. The mountaineers, inured by centuries of experience, are able to breathe and even work at a height of 19,000 feet. This means death to white men, though they are differently affected by it. Some will go almost as high as this with seeming impunity for a time, only to find themselves a week or two later unable to live at an elevation of 10,000 feet. In its worst stages this "sorache," as the mountain sickness is called, is accompanied by a deathly sickness, to which the troubles of a sea voyage are said to appear joyous; with bleeding at the eyes, ears, nose, mouth and finger-tips and a most distressing inability to breathe. Being so irregular in its manifestations, it is not unusual for a person to go to sleep in apparently good health "and wake up dead in the morning," as an Irish sufferer described it. There is only one cure—to get where the air is denser as rapidly as possible. It is worth while remembering that the natives find it as hard to breathe the thick air of the valleys as the plainsmen do the rarefied atmosphere at these great elevations.

WHAT KIND OF AN ENGINE SHALL I BUY?

THIS is a question constantly coming up to one and another, here and there. The new plant is to be installed; the water power gives out and something else must keep the wheels turning; or the water wheel must be helped out at times. and so along. Every condition under which the engine is to be operated will have its influence. Manifestly if the engine is to be used but ten days in the year it may well be a different machine than if it is to un 300 days in the year, and so on through a range of considerations such as cost of fuel etc.

What follows is especially applicable to engines of 50-horse power or more, although it may be applied to those of no more than 25-horse power, or less. Such engines as are used for stationary purposes are of two distinct types, viz.: Throttling engines and automatic cut-off engines. In the throttling engine the boiler pressure is reduced before it reaches the cylinder so as to be just sufficient to keep the engine

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"fanega," a bushel, is derived "fanegada," a small farm, and a "fanegadas," abundance or plenty. A farmer asked about his crops would reply, in case the yield was abundant, "a fanegadas," and it would be equally proper to say of a man who had money to burn "plata a fanegadas," meaning that he had bushels of money.

"Arroba" is a measure o weight meaning 32 1-3 pounds in Brazil and 25 1-3 pounds throughout the rest o South America. "Arshure" is a Russian yard of 28 English inches. Most European countries have adopted the metric system and metres, kilos and litres are in common use, but some queer names of widely different meanings still linger in Denmark and Sweden. For example, "tonde" in Denmark means 3.94 bushels, while "tunna" in Sweden means 4½ bushels. Again, "tondland" in Denmark means 1.36 acres, while "tunnland" in Sweden means 1.22 acres. —New York Sun.

COST OF MACADAM ROADS.

IN response to inquiries as to the cost of macadam roads the L. A. W. Bulletin gives the following, which are the figures in Massacusetts. Country highways are macadamized to a width of twelve or fifteen feet. There are but two of the narrower width in the state as yet. In villages the width varies from eighteen to thirty-four feet, and the depth is according to traffic. On sandy, gravelly or porous soil the broken stone is laid to a depth of six inches, and on clay or wet soil telford is laid to a depth of eight inches and covered by four inches of broken stone, with a layer of gravel from two to four inches in depth on top of the clay and beneath the telford.

The cost includes excavations, drains, telfording, gutters, culverts, fences, monuments and engineering, in addition to the macadam. At the end of 1896 the average cost of the 107 miles, completed, was $10,369. (Macadam, $5,485, and miscellaneous, $4,884.)

Average cost per mile of grading..... ...	$1,391.00
Average cost per mile of drains.....	150.18
Average cost per mile of telford....	782 81
Lowest cost per ton of broken stone..... ...	1.06
Highest cost per ton of broken stone.....	3.10
Average quantity per mile of broken stone..	3,000 tons
Highest quantity per mile of broken stone..	4,400 tons
Lowest cost per mile of macadam.....	$ 3,000 00
Lowest cost per mile of completed road.....	5,600.00
Highest cost per mile of completed road ..	23,000.00

MONUMENT TO THE POTATO.

A CURIOUS monument has just been discovered in the dense undergrowth of the so-called Brandhai, in the Upper Harz, says the Westminster Gazette. It is a granite block about seven feet high, resting on a stone pedestal, and on an iron tablet attached to it is the following inscription: "Here in the war 1747 the first trials were made with the cultivation of the potato." The German peasant of the time did not take kindly to the potato plant on its introduction to the country. It had, however, a great friend in the king, Frederick II., who was convinced of its value, but who was obliged to use forcible measures to get the people of Pomerania and Silesia to plant the bulb. The action of Harzers in voluntarily adopting the plant was evidently thought worthy of a memorial.

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[illegible] STEAMSHIP [illegible]

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[illegible] MEETING [illegible]

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FAIRMONT

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PARKERSBURG PARTICULARS

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posed building have not yet been considered, but the matter has been referred to a special committee of the board. DILLOWAY.

Detroit, Mich.

MILWAUKEE MATTERS.

As far as I can learn prospects here are good in the building line for next season.

A Mr. Pettitt is putting up a fine residence of Bedford stone. August Pabst, Jr., is also building a fine residence.

A new bridge is under way across the river from Grand avenue to Wisconsin street, which is to be completed by June next.

Fred Andree Cut Stone Company has secured the contract for the stone to be used in the new Menasha library building. This firm is equipped with all the latest appliances to turn out work at short notice.

H. Johnson, Omaha, has the contract for the Madison Library, material Bedford.

I received a letter a few days ago from Sandstone, Minn., stating there would be a chance for a few stone-cutters. The Minnesota Sandstone Company has a full year's work on hand. Cutting is to be done by piece system, and good men will not be able to make over $2.25 average per day.

A large power house is going up in this city at the present time.

The Grant Marble Company has a few large orders on hand. FRITZ.

Milwaukee, Wis.

GRAND RAPIDS GRIST.

I believe the building trade in this city will be good next summer. There is talk of several jobs, but this is a poor place for stone work. There is only one building now under way that is to have any quantity of stone in it. The project of a new library building is very likely to be largely, if not entirely, of stone. More about this next month. M. T.

Grand Rapids, Mich.

BUFFALO BITS.

Work in the stone industry here is not very good at present. In the monumental line there is a little doing. I understand that the firm of Crawford & Son have signed several contracts lately, among them a monument to be erected to the memory of the Hon. Frank Hatton, late Postmaster General during the Arthur administration. The monument is to be set up in Washington.

Buffalo is to have a new armory, to cost about $400,000. Chas. Berrick, of this city, is the contractor. Mr. De Graff, of Eagle Harbor, will do the stone work. I am informed that he will do part of it in this city.

Architect Post, of 22 Court street, has out plans for a new church on the East Side; it is to be of Medina sandstone, to cost $30,000.

Green & Weeks, architects, are getting out plans for a new bank building (Buffalo Savings Bank), to be of pink granite or marble. Job will be let in about a month.

The city is going to do some work here in the spring unless all signs fail. There is an Observatory to be built at South Park. There are four park entrances to be built at a cost o $3,000 each.

The contractors on the waste weir on the Erie Canal, at Middleport, have had all of their stone condemned by the State Inspector because they have violated the State law in having it cut in Pennsylvania instead of within the boundary of this state, as per Chapter 415, Laws of 1897.

Mr. Gus Laungenbahn, of this city, has secured the contract for the carving on the new post office building. He is also cutting a granite figure here. MARX.

Buffalo, N. Y.

CLEVELAND CLEWS.

There was a large amount of stone work on the streets of this city last fall, and considerable is still in progress on the "boulevard system." Previous to the hard weather setting in all hands were working, for the first time since the summer of 1893.

Most of the building work is now closed down. This means an early start for a number of the boys on next season's work.

Cleveland's most beautiful cemetery will, in all probability, soon have an imposing entrance of stone. The "lodge" or office and waiting rooms at the entrance were recently finished by mason-contractor Smith.

The big ten-story block to be erected on Prospect and Erie streets will probably have been let by the time this is printed. A feature of this building will be an open court. This ought to be a good job for stone-cutters, but I think they can hardly expect more than the trimmings.

Present indications are for a good summer's business in the stone industries.

Cleveland, O. GEORGE.

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RECENT PATENTS.

STONE WORKING MACHINE.

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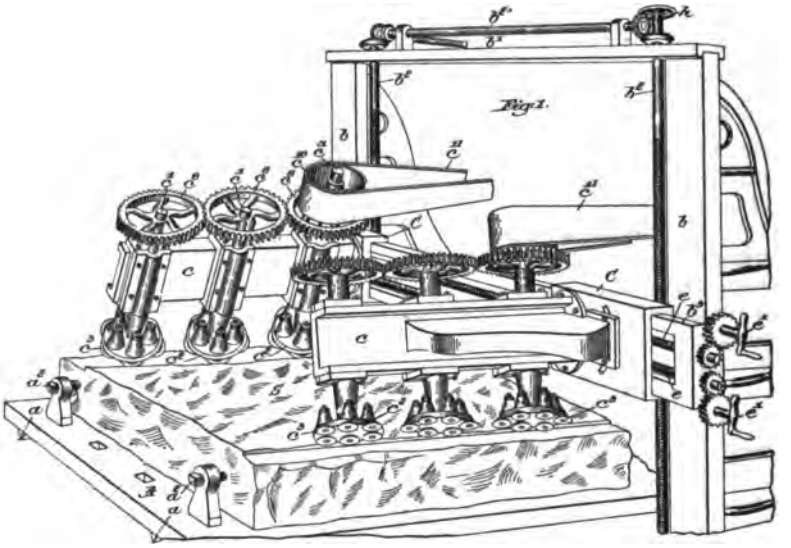


Fig. 1.

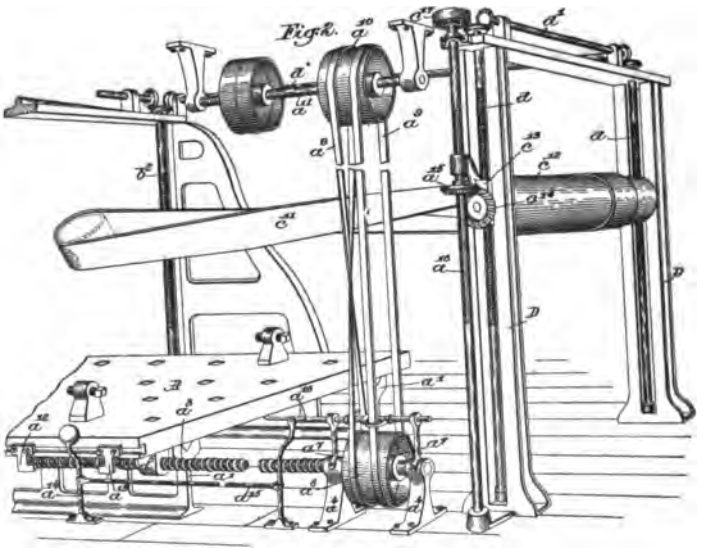


Fig. 2.

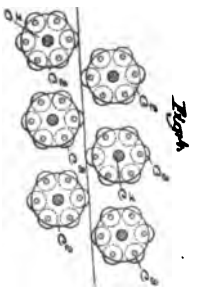


Fig. 4.

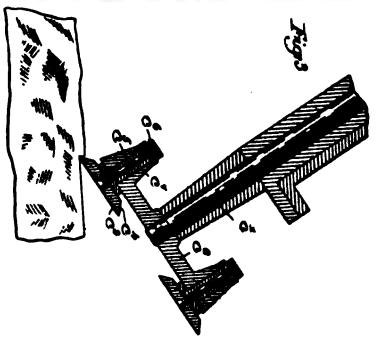


Fig. 3.

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becker, and the third John Baringer. Hartman was so badly injured that he begged the physician to take his life to relieve him of his sufferings. He is not expected to recover. Pennebecker may lose the sight of one eye, but is expected to recover. Baringer was badly burned about the face and hands.

Fort Piain, N. Y.—By an explosion of dynamite in the quarry of Snyder & Cranker, in Nelliston, Henry Myers nearly lost his life. Five holes had been drilled for the purpose of blasting. The boss of the quarry is Henry Clare and he also does the tamping. In working on the first hole, preparatory to turning on the current, Clare cut the wires, thereby disconnecting all possible means of a circuit. Although the dynamite cartridge had already been placed in position, orders were given by the boss to have the hole "dug out." This work fell to Enoch Prall and Henry Myers. The men commenced hammering, Prall doing the striking and Myers holding the drill, which was a steel bar over four feet in length and one and one.eighth inches in diameter. The men had been at work but a short time drilling when the explosion occurred, and rocks, earth and men were hurled in the air. Myers' right arm, fingers and wrist were broken, a big gash cut in his hand necessitated the amputating of the little finger, and besides these injuries the left side of his face and eye were terribly burned by the powder, he being so close to the drill hole that his face was filled with powder so that he was hardly recognizable. Prall did not receive any severe injuries. Many of the workmen cautioned Clare about the dangers connected with drilling out holes, but their cautions went unheeded.

Boston, Mass.—Edward W. Garben and Antonio Rosso were working together in the stone cutting yard of Philip H. Butler, when a slab of marble fell on them. Garben's right ankle and Rosso's left leg were broken.

A large rock falling from overhead in the cement quarry at Sharpsburg, Md., struck Dahlen Johnson on the head, inflicting painful injuries.

Allentown, Pa.—Two men were instantly killed, one fatally injured and two others seriously hurt by a fall of rock in the Penn Slate Quarry of the old Lehigh Slate Company, of Slatington, Pa. The dead are Fred Shieber and John Bellows, Jr. A Hungarian known as Mike was crushed so badly that no hope is entertained for his recovery. Captain William H. Keener, formerly commander of Company H., Fourth regiment, N. G. P., and Milton Neff, were badly bruised. The men were at work in the quarry when, without a moment's warning thousands of tons of rock, forming the south bank of the quarry, gave way and slid one hundred feet into the bottom of the quarry, carrying down the boiler house and boiler. Shieber and Bellows were directly beneath the fall, and were instantly killed. The fall is supposed to have been due to the recent thaw which followed the cold weather.

Middle Granville, N. Y.—John C. Davies, while at work in the Willis red slate quarry, had his hip dislocated and head badly bruised. The accident was caused by the slippery rocks.

George B. Jones, Newark. N. J., had his legs crushed under a five-ton rock when the tackle of a derrick broke in the quarry at Franklin Furnace.

Newark, N. J.—Three men are badly injured because they had the temerity to pound on a stick of dynamite with a drill. They may all die. They were employees of the Passaic Quarry Company. A dynamite charge had been put in a hole but failed to go off. Foreman John Perkins took Tom Luzzo and John Cengarella, Italian laborers, down into the quarry with him and prepared to drill out the dynamite. Perkins poured a large quantity of water into the hole in hopes of rendering the dynamite useless, and then inserted a drill. He stood directly over the hole and the Italians were close by. Just as they began drilling a terrific explosion occurred. That ends the story.

Granville, N. Y.—An unexpected and singular accident occurred at Norton Brothers' quarry No. 8. A blast was exploded at quarry No. 1. The force of the explosion was so great that a stone weighing seventy-five pounds was hurled onto the banks of No. 8, a distance of twenty or thirty rods. It struck the bank on a slant, rebounded and plunged through the side of a building in which several slate trimmers were at work. The rock struck John J. Parry on the left side of his face. His jaw and cheek bone were broken, the forehead terribly bruised and the left eye crushed and partly gouged out. Thomas Thomas was also slightly injured on the hip by being struck by a board knocked in by the stone.

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MACHINERY AND SUPPLIES.

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tower. The machine works with remarkable smoothness. It employs the standard Lidgerwood carriage and the Miller fall rope carriers, and is the only practical form of electric cableway that has ever been introduced.

FRONTIER IRON WORKS, DETROIT, MICH.,

Report that they now have ready for the market four sizes of their new "Frontier Vertical" gas and gasoline engines, and that other sizes will be ready about March 1. This engine is designed for work that requires powers ranging from 1 to 10-horse power. Above this size they build their "Frontier Tandem" two-cylinder engine ranging from 10 to 100-horse power. They report a largely increased demand for both types, especially for pumping and mill work.

SITUATIONS WANTED.

Advertisements under this heading inserted for subscribers to STONE *free of charge. Advertiser must send 25 cents to pay postage, if replies are to be addressed in care of* STONE. *Rate to non-subscribers, 10 cents per line each insertion.*

SITUATION WANTED—The advertiser, author of "Practical Stone-Cutting," now appearing in this paper, and of other works upon stone-cutting, desires a position, either as Draughtsman or Foreman (former preferred) in stone yard; am a stone-cutter and practically conversant with the management of stone-working machinery and men; can procure the best of references from former employers, for ability, etc. Address C. H. F., 108 Fourth St., Oakland, Cal.

SITUATION WANTED—To wholesale or retail marble and granite, by an experienced man. Many years on the road in both branches of the trade; willing to travel by railroad anywhere, and at very low salary on the start. Address, "GRANITE AGENT," 827 Jefferson avenue, Oshkosh, Wis.

SITUATION WANTED—A man who thoroughly understands the stone business, all machinery in connection, and placing the same in position, would like to correspond with any parties in need of such a man. Would be at liberty from now until the middle of March to investigate any stone property for parties in need of an expert in that line. Plenty of references. Address, "P. M.," Rock Glenn, N. Y.

TO SELL. TO BUY. TO EXCHANGE.

Advertisements inserted in this department for 15 cents per line each insertion.

FOR SALE—Bonny Brook Lime Kilns plant, located near Carlisle, Pa., on line of Gettysburg and Harrisburg railroad (Reading system), consisting of about five acres, dwelling house, four kilns, crusher, boiler tools, siding, etc. Ready for operation. Address, L. R. SPONG, West Fairview, Pa.

FOR SALE—Troy Steam Stone Works; $6,000 will buy a first-class mill, engine, boiler, two steam hoist derricks, capacity 15 tons, three planers, four gangs saws, boring machine, hand drill and all tools, with a $2,000 stock of stone. This plant would be a bargain at $20,000. Owner has other interests to look after. For particulars address, T. H. MAGILL, Troy, N. Y.

FOR SALE—Part or whole interest in a fine limestone quarry, well situated as to markets and railroad facilities. A great opportunity for a good quarryman with capital. Address P. O. Box 198, Wyoming, O.

FOR SALE OR LEASE—The Rock River Brownstone Quarry. The property of the Rock River Brownstone Co. is located some twenty-five miles east of Marquette, on the shore of Lake Superior, and also on the D. S. S. and A. railroad. This property was operated last season, and has machinery, saw mill, etc., on the premises ready for operation. It is desired to lease this property to some good, competent quarryman on a royalty or otherwise. Address communications to W. I. BROTHERTON, Bay City, Mich.

FOR SALE—Two bluestone quarries, located at Summit, N. Y., and Cascade, at Lanesboro, Pa. For particulars address, T. H. MAGILL, Troy, N. Y.

WANTED—One strong, heavy planer, for rough work, to take in stone 12'x6'x3'. Address, CLYDESDALE STONE CO., Preble avenue and Bayard street, Allegheny City, Pa.

FOR SALE—Two drills made by Ingersoll-Sergeant Drill Co.; cost $950 each; price, $200 each; good as new. For particulars address, T. H. MAGILL, Troy, N. Y.

HELP WANTED.

Advertisements under this heading 10 cents per line each insertion.

WANTED—A thorough experienced man to take charge of interior marble finishing department, one who is well versed in plans and who has a full knowledge of every detail pertaining to the above work. Address, "A. B. C.," Care STONE.

WANTED—Foreman for Marble Shop. One who understands cutting, and operating marble machinery, and is familiar with getting out plumber and small building work. Address "FOREMAN," care STONE.

HOISTING ENGINES,

Locomotives, Relaying Rails, Air Compressors, Drills, Steam Pumps, Engines, Boilers, Stone Crushers, Etc.

NEW AND SECOND-HAND

THOS. P. CONARD,

119 So. Fourth St., Philadelphia, Pa.

Hawley's Patent Sand Feed

Is used by all the leading firms—saws faster and better than any other sand-feed. More gangs using our feed than any other. Easily kept in order. Also many gangs working satisfactorily, using crushed steel. Can give best of references.

Orders solicited.

E. J. & C. H. HAWLEY,

Manchester, Vt.

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A COLD REALITY



H[illegible] stood and gazed
with wide-staring eye
A fair old world it seemed
Where h[illegible] and joy
and love alone
In radiant splendor
seemed
The [illegible] reflected
the joy we have,
The [illegible] gathering
[illegible]

[illegible]

The good fish swam the rippling tide
That fed and the gleaming reel
The gay birds fluttered over the head
Where roamed the golden reel
Each man and maid had golden hair,
Each brow a glorious head
And gracious members fed and clad,
For good had banished need

No ground upon the treasure vast,
There shrewd and cheating to give
And ever one day long hour had passed
As measure we can be
But with no life above a change had come,
The [illegible] were here and [illegible]
[illegible] grew with the fingers numb—
No [illegible] [illegible]

[illegible]

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BOOKS AND PERIODICALS.

AN OREGON BOYHOOD, by Rev. Louis Albert Banks, author of "Common Folks' Religion," "White Slaves," etc. Lee & Shepard, Boston. Cloth. Illustrated. Price $1.25.

Dr. Banks takes his readers into an entirely new field in "An Oregon Boyhood," in which he gives the present generation a description of the scenes and adventures of boyhood and youth in that far western country. The youth of the present day, who knows that the journey to Oregon is only a six days' ride in a palace car, can hardly realize that the author's father crossed the country in 1852 in a "prairie schooner" drawn by oxen and consumed six months in the journey from Arkansas to the banks of the Willamette, where he settled. The descriptions of the occupations of a growing boy in a new country are fresh and vivid. Commencing with early life in a log cabin, the author "grows up with the country." The hunting and fishing instinct is early developed, and many exciting adventures which could take place only in such a country are recorded. School life, mountain climbing, winter sports and occupations, life in the mining camps in the early days of gold mining, early salmon-fishing, are among the subjects described, which make this an intenseley interesting book for young and old.

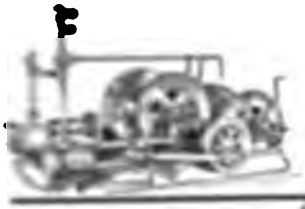
The initial paper of the February *Chautauquan*, "The Rhine Country," by H. A. Guerber, is made temptingly attractive by a galaxy of fine half-tone cuts reflecting the most interesting features of that picturesque and romantic region so dear to German hearts. Wagner's great masterpiece, the opera of "Lohengrin," is affectionately dealt with by Charles Barnard in the same number. The textual presentation of the subject is a simple narration of the plot, the imagination being aided to an appreciation of its dramatic possibilities by several illustrations depicting the most striking scenes, supplemented by excellent portraits of Madame Nordica and Max Alvary, two eminent actors who have linked their fame with that of the play. The frontispiece represents Lohengrin's parting from the sorrowing Elsa.

DOROTHY DRAYCOTT'S TOMORROWS. A sequel to "Dorothy Draycott's Todays," or "Sirs, Only Seventeen." By Virginia F. Townsend, author of "Darryl Gap," "Only Girls," "Mostly Marjorie Day," etc. Lee & Shepard, Boston. Cloth, $1.50.

Miss Townsend has many admirers, and anything new from her pen will be received by them with great pleasure and interest. She always introduces us to characters that we like to associate with. She does not seem to expend much energy in giving us psychological analyses, but manages to call out our hearts to them. She throws upon our senses the charm of youth and beauty without diminishing our reverence for the soul within it, or permitting us to forget that it is a blossom of Divine Thought. Her plots are always ingenious and full of interest, and incidents and situations follow swiftly in her stories. Her books are always pure, and her latest production will not disappoint her many readers, it being full of incident, following the careers of several of the characters in whose fortunes Miss Townsend's readers are interested. Although in a sense a sequel to "Dorothy Draycott's Todays," it is a work complete in itself.

The complete novel in the February issue of *Lippincott's* is "A Trooper Galahad," by Captain Charles King. It contains some close and vivid sketches of character and life at an army post in the southwest; the warlike excitement is furnished by a prolonged pursuit of a dangerous band of outlaws. "His Last Appearance, by Jean Wright, and "A Literary Success," by Willis Irwin, are very brief tales. "Outwitting a Grizzly" is one of William Thomson's true stories of western adventure in old times—as far back as 1850. R. G. Robinson, who is an authority on his chosen subject, supplies some information upon Florida, "The Land of the Winter Cucumber." Fakirs, adventurers and swindlers of various kinds are the theme of Dora E. W. Spratt, in "How They Live on Nothing a Year." "The Poetry of Shelter" is one of Dr. Charles C. Abbott's very best nature-papers. Robert Timsol, in "Back From Altruria," sets forth some of the attractions and drawbacks of Mr. Bellamy's millennial state. Samuel M. Warns writes briefly of "Odors," William Trowbridge Larned of "Insomnia," Ellen Duvall of "Opportunity" and M. A. DeWolfe Howe of "The Other Side of Letters." The third paper of Dr. Theodore F. Wolfe's series, "Some Literary Shrines of Manhattan," deals with "The Latin Quarter and its Environs." There are couplets by Carrie Blake Morgan and Clarence Urmy.

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THOMAS CARLIN'S SONS.

Allegheny, Pa.

Manufacturers of Hoisting Engines, Derricks of Steel or Wood, Contractor's Tools and Machinery.

Large Stock of Locomotives, Cars and Steam Shovels on hand.



ARE YOU IN THE MARKET FOR

Rock Drills?

If you wish to buy, write us.

You can save money and get better results by purchasing one of our

"EUREKA" ROCK DRILLS.

The automatic features and economy of operation places this Drill at the head of the market. It is second to none in capacity, and has advantages in construction not to be found in others.

Catalogues, with full description, furnished on application.

THE JOHN M. ROGERS
Boat, Gauge & Drill Works,
GLOUCESTER CITY, N. J., U. S. A.

VULCAN STEAM SHOVELS

Received Highest Award at World's Fair

VULCAN IRON WORKS CO., TOLEDO, O.

Manufacturers of "Barry" Brake Shoe.



McKIERNAN DRILL CO.

120 Liberty Street, New York.

Manufacturers of

Rock Drills

Air Compressors and
Quarrying Machinery.

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CONTRACT NEWS.

Residents of Fort Atkinson, Wis., have subscribed $2,000 for a soldiers' monument to be placed in Evergreen cemetery.

A bill has been introduced in the New York legislature authorizing New York City to appropriate $35,000 to aid in the erection of a monument in honor of the martyrs who perished in the prison ships in New York harbor during the Revolutionary war.

Assemblyman Kelly, Albany, N. Y., will introduce the Soldiers' and Sailors' monument bill, to erect a memorial in Capitol Park.

Bryan, Tex.—A movement is on hand to erect a $20,000 monument to the memory of ex-Governor Ross by the alumni and ex-cadets of the Agricultural and Mechanical college.

Bayonne, N. J.—Stephen T. Mather, 185 Water Street, New York city, is manager of the Pacific coast Borax Company, and can give information as regards the proposed erection of the new factory at Bayonne.

Corunna, Mich.—The Shiawassee county board of supervisors have voted to expend $40,000 on a new court house, provided the voters will approve of their action at the coming spring election.

Ottumwa, Iowa.—The city council is seriously considering the advisability of building a substantial city jail and central station in place of the "calaboose" now in use.

New Albany, Ind.—The First Presbyterian Church was totally destroyed by fire. The loss is estimated at $40,000, with $12,500 insurance. It will be rebuilt.

Lima, O.—The St. Paul's Evangelical Lutheran congregation will commence work April 1 on the erection of a $20,000 church.

Circleville, O.—The Presbyterian Society will build a $25,000 church on the present site.

Grand Haven, Mich.—The state board of corrections and charities has approved the plans of Fairfield & Olds, of Grand Haven. Bids for the erection of the building will be received at the architect's office in Grand Rapids, March 8.

Des Moines, Iowa.—The trustees of the German M. E. Society, now worshipping in the church block on Locust street, will purchase a site for the erection of a $15,000 church. The intention is to have plans made and to commence the work as soon as the weather will permit.

Holbrook, Ariz.—Bids wanted, accompanied with plans and specifications for a court house and jail, in one structure, to be built of brick or stone, in the town of Holbrook, Ariz. Cost not to exceed $12,000. All bids to be in not later than February 18, 1898. The board reserves the right to reject any or all bids. Address all communications to J. H. Frisby.

Mansfield, O.—The German Lutheran Society has employed an architect to prepare plans for the church to be erected in the spring.

Charleroi, Pa.—The Charleroi Brewing Co. will build a new brewery. Estimated cost $600,000. Contracts not let. Oscar Boyer, 56 Fifth avenue, Chicago architect.

St. Cloud, Minn.—Breiss & Wimmer are arranging to add a new building to their brewery plant. Estimated cost $30,000. Fred Rautert, 86 Metropolitan building, Chicago, architect. Contracts will be let in February.

Representative South Trimble, of Franklin county, Kentucky, has offered a bill providing for the construction of new state buildings. The proposed work is to be accomplished under the supervision of a Commissioner selected by the Governor from the Congressional districts, with money raised by an annual tax of 2 cents on the $100, and is to begin when $300,000 shall have accumulated in the fund.

McHenry, Ill.—The Catholic congregation has decided to build a $20,000 church. Rev. P. M. O'Neill, rector.

Springfield, Minn.—The Unitarian congregation is arranging to build a new church in the spring. Address Rev. H. L. Bujzel, New Ulm.

Baraboo, Wis.—The Chicago & Northwestern Railway Company is contemplating the erection of a depot and office building next summer.

Lancaster, Pa.—The Franklin and Marshall College at this place contemplate the erection of a new building, to cost $50,000.

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SHORT-TURNING STONE WAGON





STRONGEST, BEST
AND CHEAPEST.

HANDY WAGON CO.

Saginaw, Mich

NOTES FROM QUARRY AND SHOP.

Allentown, Pa.—A can of kerosene oil exploded in the boiler house of the Beeneville cement inill, at Rosendale, eight miles north of Allentown, setting fire to the mill and storage house. Both were totally destroyed, together with four thousand bags and six hundred barrels of cement, and three hundred tons of coal. The loss is estimated at $100,000; fully insured.

Frank H. Davis has sold his marble works at Kewanee, Ill.

Topeka, Kan.—Guild & Wallwork, monuments, reported to have dissolved partnership.

Canton, Ill.—J. S. Addis is now the sole proprietor of the Canton marble works. He purchased the interest of his partner, C. H. Barnard.

W. H. Ocheltree, a marble drummer of Mason, W. Va., is mysteriously missing. Mr. Ocheltree travels for a marble firm at Phillippi, W. Va. Four weeks ago he bought a ticket for Charleston, from which place he expected to go into the interior of the State, to be absent a week or ten days. There has been no trouble in the family, and on previous trips he has been in the habit of writing to his wife every few days. Notwithstanding this fact, she has not heard a word since he left.

Knoxville, Tenn.—A recent investigation shows that the marble industry of this locality for 1897 was prosperous when compared with previous years, or with other industries of the south. During the year two new enterprises were added to the list, that of the John J. Craig Marble Co. and Christian Monday, each of which have opened up quarries and are placing their products on the market. These with seven other marble companies doing business around Knoxville produced about 235,000 cubic feet, block, and the valuation of this output at $1.25 per cubic foot is $293,750. These latter figures would be practically doubled if we take into account the value of the finished product sent out by our mills. The mills are all running at full capacity and the gray and pink marbles are coming more and more in demand, both as building stone and for interior decorations.

Des Moines, Iowa.—The Iowa Soldiers' and Sailors' monument, costing $150,000, which has been the object of contention and strife from the time of the inception of the plan to construct, will not be dedicated. The house of representative military committee unanimously voted to indefinitely postpone a resolution providing for the dedication. The committee was disgusted with the protracted strife, and with the action of the executive council in permiting the medallions to go on the monument after the legislature had expressly decided they should not go on.

Louisville, Ky.—A rumor to the effect that a war between rival cement companies was on is denied. The story ran that J. B. Speed & Co. and the Utica Lime Company were engaged in lively throat cutting, and that the price of cement would be cut nearly in half. J. B. Speed and John L. Wheat representing the two companies, were asked if a cut was contemplated. "There will be no further cut unless conditions imperatively demand it," said Mr. Speed. "No fight is contemplated, though, of course, the price of cement is like the price of any other staple, liable to change. About ten days ago a small reduction was made, but this amounted to little and was in no way significant." John L. Wheat also said that there would be no war of prices. He said that nothing in the present situation warranted such a rumor, and that the cement association, of which both firms are members, was strong and free from dissension. Mr. Wheat said that prices would at least be maintained at the present figures.

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THE "NEW INGERSOLL"

WRITE FOR CIRCULAR.

Air Compressors - Rock Drills - Coal Cutters

The Pohlé Air Lift Pump.

The Ingersoll-Sergeant Drill Co.,

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Genesee, Wis.—The Wisconsin Stone Company shipped the past season nearly 500 carloads of stone and expect to increase that amount to 2,000 the coming season. They have a gang of men at work now stripping off a large bed.

Springville, Utah.—Development work is still progressing on the Buck Eye marble quarry in Hobb's creek canyon. A force of from four to six men is working there steadily and they now have near a hundred tons of stone quarried out. They have a ledge of the marble uncovered 50x40 feet in extent, and still the possibilities of the ledge are not fully shown. This will undoubtedly prove one of the wealth-producers of the state and will be a great help to Springville's progress, as the quarry is only about nine miles distant.

Old soldiers are warned against a purported monumental association which proposes to erect a soldiers' monument at Columbus, O. The agents will sell you a lithograph of a monument for $3.75 and promise that your name, company and regiment will appear on the monument. The lithograph is worth about ten cents and the whole thing is a swindle. No such association exists and there is no such monument in contemplation.

Sandusky, O.—An extensive deposit of soapstone of the purest quality and entirely free from injurious foreign substances has been discovered a few feet below the surface two and a half miles east of Reedtown. It has been found to be an excellent material for the manufacture of slate pencils and will be utilized and developed for that purpose by capitalists who are now on the ground and making preparations to build a factory. They claim they will turn out the best and cheapest pencils ever made and say they will have more orders than they can fill.

Middletown, N. Y.—The Pochuck Granite Company is reported to have bought the Pierce Company's building, now occupied by its cutting works, for $6,000. The company has large orders ahead and will, it is said, increase its force as soon as a switch to the quarries is completed, thus insuring an abundant supply of stone.

Shokan, N. Y.—About sixty men are now engaged at Powelson's limestone quarries in quarrying stone for the foundation for the new East River bridge. Nearly 150 tons of stone are quarried daily, the stones varying in weight from five to sixteen tons each. Ten cars of stone are shipped daily. Although three engines are now engaged, two more are soon expected to increase the facilities. Over $20,000 is already invested in the buildings, machinery and supplies.

New York, N. Y.—All is once more harmonious in the marble industry, and the employers and journeymen are doing business under their new agreement without any of the expected friction. Work in the trade is very dull.

The New York City employers in the stone trade have been notified by the Granite Cutters' union that on and after April 1 its members will demand $4 a day. This applies at present only to the men in Manhattan borough. The Brooklyn Granite Cutters' union will likely take similar action, as the New York and Brooklyn unions are to be amalgamated this month.

DeGraff & Roberts, Albion, N. Y., have the contract for the stone to be used in the construction of the new armory at Buffalo. The contract will extend over two seasons and over 200,000 surface feet of stone will be used in the walls. All the stone will be dressed at Albion before shipment, and this means a good job for a host of stone-cutters.

Winona, Minn.—Philip Biesanz has secured a large contract that will make things lively around his stone quarry for some time to come. It is with the Green Bay railroad, and is to furnish all the cut and rough stone to be used in building a bridge over the Black river at Hatfield. It will require 700 yards of cut stone beside the rough stone and will be quite a long job. The work will all be done at the quarry and the stone loaded on the cars there and shipped to the bridge. The quarry, which has been shut down, will be started immediately and run to its capacity, giving employment to forty men. Mr. Biesanz has also secured a contract for a large amount of sidewalk for Davenport parties and with the work that will come in when building operations commence in the spring expects to have all the work he can do till next fall.

The seventy-fourth meeting of the American Institute of Mining Engineers will be held at Atlantic City, N. J., beginning on Tuesday evening, Feb. 15, 1898.

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TO INVESTORS!



An opportunity for investment in profitable [illegible] manufacturing plant is open to a man of capital [illegible] in the business. The [illegible]

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Working Capital is required to Carry the business and meet th Growing demand for the products.

Present owners will retain large interest and [illegible] control [illegible] step down and out

Investment amply secured by valuable real estate, [illegible] plant. No [illegible] encumbrances

Everything strictly right and Honest in this offer. . .

Parties interested can be put [illegible] with [illegible] by addressing the

Publishers of "STONE."

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There are about 1,300 men engaged in the slate business in Rutland county, Vermont, at present, and if business revives in the spring, as is expected, about three hundred more men will be added.

Jacksonville, Ill.—The annual convention of the Illinois Marble and Granite Dealers' Association met here Jan. 26. The address of President John Merkle, of Peoria, was followed by the reports of the secretary and treasurer. The association then heard addresses from different members. In the evening the members were entertained by Professor Frank H. Hall at the institution for the blind with a concert and also exhibitions of the pupils' work in literature, music and the useful trades. At the election the old officers were re-elected.

The Retail and Wholesale Marble Dealers' Association of New England and the provinces held its ninth annual meeting and banquet at the American House, Boston, Jan. 26. The following officers were elected: President, O. M. Wentworth, Braintree, Mass.; secretary and treasurer, William A. Somers, Dorchester district, Boston, Mass.; vice presidents, Stephen Maslen, Hartford, Conn.; James E. Stanton, St. John, N. B.; Everett Torrey, Boston, Mass.; John S. Treat, Portsmouth, N. H.; Redfield Proctor, Rutland, Vt.; Alonzo T. Farnum, Providence, R. I.; directors, George E. Morrison, Biddeford, Me.; Clarence D. Palmer, Manchester, N. H.; E. R. Morse, Proctor, Vt.; John J. Love, Webster, Mass.; George William Green, Woonsocket, R. I.; Thomas C. Smith, New Britain, Conn.; George B. Baxter, Fredericton, N. B.

Bloomington, Ind.—The new officers of the Central Stone Company are: President, John Waldron; vice president, James D. Showers; secretary and treasurer, William N. Showers. Directors—John Waldron, James D. Showers, W. N. Showers, W. W. Wicks and Frank Brodix.

Ambassador White, under date of Berlin, Dec. 24, 1897, informs the Department of State that, on the 16th of December, the German Federal Council decided, in view of the "evident inadequateness" of the present supply of 10-mark ($2.38) pieces, to coin 20,000,000 marks' ($4,760,000) worth of these pieces in gold, and, further, to coin 16,000,000 marks' ($3,803,000) worth of silver 5-mark ($1.19) pieces, about 8,000,000 marks' ($1,904,000) worth of silver 2-mark (47.6 cents) pieces, and about 4,500,000 marks' ($1,071,000) worth of silver 1-mark (23.8 cents) pieces.

The Whitton Granite Quarry Company has just opened a large granite quarry on the Quebec Central Railway, near Lake Megantic. The granite is a dark gray, free from iron, and is a first-class stone for building or monumental purposes. The company has already spent a large sum to open this quarry and can now take contracts for any size stone at a very low price.

The annual meeting of the Granite Railway Company was held at their Boston office on Jan. 24 and the following officers were elected: Wm. B. Sewall, president; John R. Bullard, vice president; R. B. Williams, H. E. Sheldon, Howard Sargent, Otis H. Luke, directors; J. A. Tinifson, clerk and treasurer. The company paid dividends July 1 and Jan. 1. At the directors' meeting Mr. Sheldon, who has been connected with the company for twenty-eight years, presented his resignation as general manager, which position he has filled for twenty-one years. His successor has not been appointed.

The Iowa Marble and Granite Dealers' Association held its annual convention in Des Moines on Jan. 20, with an attendance of about fifty. Des Moines will again entertain the Association next year on the third Wednesday of next January. Officers were elected as follows: President, J. M. Graham, Des Moines; secretary and treasurer, G. J. Gruber, Muscatine; vice presidents—J. C. Sullivan, Creston, southwest district; H. K. Dodge, Webster City, northwest district; A. R. Taylor, Waverly, northeast district; and F. L. Root, Ottumwa, southeast district. The new board of directors consists of C. J. Field, Creston; J. E. Agnew, Newton; C. J. Ambrosius, Chicago; J. F. Bloom, Council Bluffs, and J. Ruge, Ft. Dodge. A legislative committee named last year, J. M. Graham and Chas. O'Donnell, of Des Moines, and Eli Gaiser, of Knoxville, reported progress.

The thirteenth annual meeting of the Illinois Society of Engineers and Surveyors was held in Peoria, Ill., Jan. 26–28, inclusive, and the papers and discussions will be published in the report which will be placed in the hands of engineers and surveyors throughout the United States and Canada. Twenty-two members were added to the Society at this meeting, which was the largest attended of any in its history.

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NEW YORK,

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THAT IT HAS PURCHASED [illegible]

THAT IT HAS DEVELOPED [illegible]

THAT IT IS PREPARED [illegible]

THAT IT WILL SEND ANY [illegible]

THAT IT CONSIDERS [illegible]

THIS COMPANY INAUGURATES [illegible]

IF YOU HAVE AN AIR COMPRESSOR. [illegible]

IF YOU HAVE NO AIR COMPRESSOR. [illegible]

The Consolidated Pneumatic Tool Company,
1404 Bowling Green Building,
NEW YORK.

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The December report on Quincy, Mass., granite shipments is as follows: By quarry railroad, 3,522,745 pounds; from West Quincy, 3,050,180 pounds; from Quincy Adams, 3,331,909 pounds.

The New Year number of the Canadian Architect and Builder, Toronto, is an artistic and altogether creditable production—in keeping with the importance of the building interests. It consists of forty pages of letterpress and ten plates illusrtative of architecture in the various parts of the Dominion. Among the more important features of this number are: A double page plate of portraits of prominent Canadian manufacturers of building materials and appliances; a double plate showing perspective view of the proposed Victoria Square opposite the new City Buildings, Toronto; an illustrated article on the recent building disaster at London, Ont.; an article by Mr. G. A. Reid, R. C. A., on Mural Decoration with reproduction of panels designed to adorn the walls of the new City Buildings, Toronto; an article on the American Tall Building, by Professor Capper, of McGill University; a report of the recent convention of the Ontario Association of architects, etc.

We have from the publishers of the Scientific American, a cloth-bound copy of a catalogue list of articles that have appeared in the Scientific American Supplement. These articles embrace innumerable subjects on modern experiment and practice in the economic arts and industries. The catalogue enables one who is seeking information to select a treatise on the topic desired, by ordering for 10 cents the issue of the Supplement containing it.

Volant, Pa.—John Corbin has leased the lime. stone quarries on the farm of W. W. Drake and will manufacture field and building lime during the coming summer.

New Britain, Conn.—John Meehan is said to be preparing to open a stone yard.

Benton Ridge, O.—Frank Bowersox will open a stone quarry next spring for the quarrying of building stone.

H. W. Dunn, of Ellsworth, Me., will start a granite and marble yard in Cherryfield within a few weeks. W. L. Wilson will be in charge.

A syndicate of Connecticut and New York men have designs on Mt. Tom, in Massachusetts. It is said they are to establish an extensive stone-crushing plant near Mt. Tom station on the Boston & Maine road, and have a large tract of land near the east end of the mountain. The trade was made through G. H. Guliff, a civil engineer of Berlin. Ten acres was bought of R. F. Underwood, of Mt. Tom, and thirty acres north of this and extending around the end of the mountain nearly to the road which leads to Landlord Street's Mountain House has been bought of the Joseph Parson's estate.

Lexington, Va.—The new year has opened with the revival of work at the quarries of onyx stone at Rapp's Mill on the headwaters of Buffalo (Snakefoot) in this county. E. B. Hussey and son, representing the Virginia Onyx Company, have a force of hands engaged in opening up the quarry preparatory to putting in a tramway to convey the stone to Rapp's Mill. At that point they are erecting buildings into which they will put machinery to saw and dress the stone. The machinery is to be run by water power. There is enough of this stone in sight to occupy a force of hands for some years. The stone was discovered several years ago in a cave on the farm of J. B. Rapp. Ohio parties bought the land and opened up the quarry. They shipped specimens of the stone to Cincinnati, where it was dressed and examined by experts. The result of this examination is that the owners of the quarry are going systematically to work to get out the stone and dress it for market. It will be hauled to Buchanan, the nearest station, which is ten miles distant. The stone is of many colors. It takes a fine polish and is in demand at good prices.

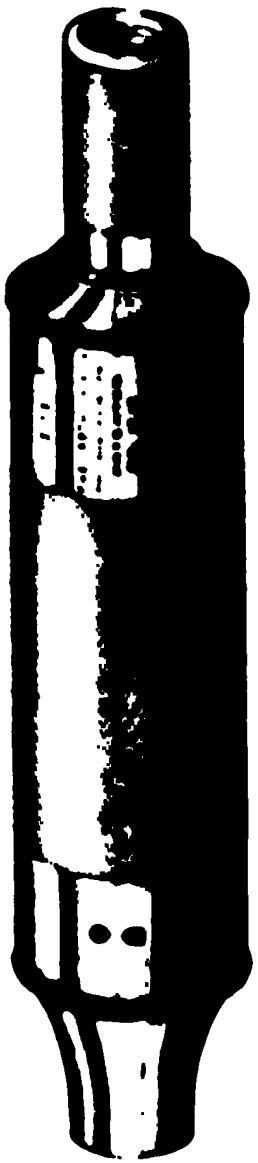
Sandstone, Minn.—Stone-cutters on piece work here have been granted a raise of 25 to 30 per cent in wages.

Milwaukee, Wis.—The Grant Marble Company will build a marble mill at the corner of Twenty-seventh and Canal streets. The building will be of brick and stone, 80x280 feet in general dimensions and 16 feet high, and will cost $9,000.

The Illinois Trust and Savings Bank, Chicago, as trustee, bought the stone quarry of Dolese & Shepard, with twenty acres of land at Hawthorne, Ill., at a judicial sale at the Real Estate board rooms for $96,000. The sale was for the benefit of creditors.

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The New Clement Valveless Pneumatic Tools . . . .



For Carving, Lettering and Cutting **Marble, Granite,** and all varieties of hard and soft **Stone,** are built on entirely new lines, and they are covered by patents that were granted without a single reference to any other pneumatic tool or patent in existence.

This can not be truthfully said of any other pneumatic tool on the market.

Our tools are cheapest because they are the **Best,** as they are the
Most Powerful,
Most Durable,
and the **Simplest Tool** to use.

They will do [illegible] more work in a given time than any other tool, because of their superiority of strength and [illegible] start cutting from the sharpest corners and finish [illegible] there is absolutely no "kicking" to the tool.

As each tool is very thoroughly and the very best material is used in their construction we have no hesitancy in guaranteeing them against all defects for TWO YEARS.

Tools are sent on 10 days trial and are [illegible] approved of.

Full [illegible] sent on application.

Estimates on [illegible] furnished.

THE CLEMENT PNEUMATIC TOOL COMPANY.

123 and 125 South Eleventh St. PHILADELPHIA, U. S. A.

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Cambridge, Mass.—M. J. Mundy, marble, reported to have recorded chattel mortgage for $1,008—discharged previous mortgage for $900.

The rates on marble from Georgia to the Ohio river are to be reduced. In the past the north Georgia marble men have said that the Vermont quarries had better rates and were thus enabled to underbid Georgians in the west. In consideration of this and for the purpose of encouraging the marble industry, the rates to the Ohio river are to be reduced 2 cents per hundred pounds.

Trenton, N. J.—In pursuance of a notice sent out to the creditors of John D. Payran, proprietor of the marble and granite works, this city, who has become financially embarrassed, a meeting was held at the office of Lawyer F. C. Lowthorp and a committee was appointed to investigate and advise the creditors what course to pursue. The committee reported that Mr. Payran's indebtedness amounted to about $1,950 and his assets to $2,285.50. The committee advised that the creditors had better agree to extend the time of payment so the 50 per cent. could be paid to each creditor about the middle of next July, and further advised that Mr. Payran be allowed one year within which to pay the balance.

Gabriel Laager, of Carlinville, Ill., has purchased the marble cutting and monument manufactory of H. F. Nather, in Collinsville and will remove his establishment from Carlinville to that place.

Sturgeon Bay, Wis.—The Laurie Stone Company was reorganized and new officers were elected as follows: President, Mrs. William A. Drumb; vice-president, Lizzie Laurie; secretary, treasurer and manager, John A. Laurie. It is the intention of the company to get matters in shape for a large business next season.

The Hamilton Lime and Stone Company, Ltd., of Byron, Fond du Lac county, Wis., has increased its capital stock from $35,000 to $75,000.

Cincinnati, O.—All of the manufacturers of plumbing marble work in the United States, some thirty firms, have been represented a at conference here. A marble combine was effected by the formation of a national Association, of which Frederick J. Lautz, Buffalo, N. Y., was elected president; John Mueller, of Cincinnati, vice-president, and Frank S. Grobe, of New York, secretary. It was agreed that a uniform schedule of prices shall be adopted, and no outside manufacturer can compete for business without adopting the local schedule of its territory.

Newton, N. Y.—The P. J. Carlin Company, of Brooklyn, which began quarrying Pochuck granite about six months ago, at a point between the Empire quarries and Glenwood, has contracted for the abutments of the new East River bridge. This contract will require $500,000 worth of Pochuck granite to fill the order.

St. Albans, Vt.—At the annual meeting of the Fletcher Granite Company the following were elected directors: A. S. Richardson, G. P. Twigg, James M. Foss, Ernest R. Fletcher, and C. S. and W. R. Fletcher. The directors elected Mr. A. S. Richardson president, G. P. Twigg vice-president and E. R. Fletcher, manager and treasurer.

New York—When the ornaments on the Commercial Cable Company's building in Broadway and also for a mausoleum in Woodlawn cemetery, were designed for the Maine and New Hampshire Granite Company by W. Clark Noble, who has his studio at 114 West Eighteenth street, Mr. Noble informed the granite company that he expected to receive for the work the rates charged by sculptors, and not the rates paid to ornamental stone workers. The company upon the completion of the work paid to Mr. Noble only $500, however, and afterward refused to pay the balance, asserting that it was excessive and unjust. Mr. Noble at once brought suit in the United States Circuit Court for the balance of the money, and the trial took place before Judge Wallace and a jury. Expert sculptors testified that Mr. Noble's claim was a just one, and the jury awarded to him $2,598.47 as the balance of his contract, and $169.75 interest.

Alameda, Cal.—D. S. Mackenzie, stone contractor, reported to have given deed of trust for $650.

Hutchinson, Minn.—George Nelson, marble, reported to have recorded chattel mortgage for $242.

St. Louis, Mo.—George G. Prendergast, stone contractor, reported to have given judgment or 280.

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Sullivan Quarry Bars
Sullivan Gadders
Sullivan Rock Drills.

RAPID STRONG CONVENIENT



Channeling Machines for All Kinds of Work.

Prospecting Quarry Lands with Core Drills.

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Easton, Pa.—F. M. Hower, one of the best known slate operators in Pennsylvania, has sold his slate land of sixty-two acres, quarry, buildings and entire manufacturing plant at Danielsville to the Hower Slate Company, organized under the laws of West Virginia. The president is Edwin T. Rice, Jr., of New York, and the secretary and manager, Charles A. Morrison, of Easton. The capital is all English and the buyers are represented by F. C. Davis and A. Hilt, of London. It is understood that Mr. Hower will receive about $200,000 for the plant.

Washington, Vt.—A movement is on foot to form a stock company for the purpose of purchasing an interest in the Warner Granite Company.

Gordon McKenzie, one of the best known granite manufacturers of Quincy, Mass., died at his home in that city, aged 56 years.

Quincy, Mass.—Mr. James O'Heron, junior member of the well-known granite firm of Maguire & O'Heron.

Waterville, Me.—Stevens & Langdale, marble, succeeded by L. C. Stevens.

Austin, Tex.—J. S. Simpson, marble works, reported to have sold out.

A. C. Brandon has recently purchased the Missouri Valley Cut-Stone Works, Twenty-third and Central streets, Kansas City, and will start them in the spring. He will make needed improvements in the equipment.

Malone, N. Y.—H. J. Bliss, marble, reported to have admitted C. J. Dickinson and C. H. Felton.

New York—C. D. Jackson & Co., importers marble, succeeded by C. D. Jackson, same style.

Binghamton, N. Y.—Ingalls & McClintock succeed Edwards & Decker in the bluestone business.

Bushnell, Ill.—Ed Heister and Albert Riepen are the new proprietors of the Bushnell Marble and Granite Works.

Louisville, Ky.—Henry W. Spears, W. C. Kennedy and S. S. Foss have filed articles of incorporation as the Kentucky Portland Cement Company. The place of business will be at Valley Station. The new company will manufacture Portland and hydraulic cement. The capital stock is to be $9,000, divided into 180 shares of $50 each. Each of the three incorporators owns sixty shares of stock. The indebtedness is not to exceed half of the capital stock.

A charter has been issued to the Pennsylvania Stone Company; of New Castle, Pa.; capital $40,000.

New York—The Rockland Stone and Silica Company has been incorporated by William M. Thomas, of Bayside, L. I., and others; capital stock, $10,000.

Shreveport, La.—The Eagle Gap Quarry Company, Ltd., has been incorporated with W. T. Crawford, president; C. S. Slayback, secretary, and John T. Talbot, treasurer; to quarry and sell rock and develop quarries in Louisiana and Arkansas; capital stock $10,000.

Middletown, Conn.—James C. Fox and Fred Becker have formed a partnership under the name of Fox & Becker, to engage in the marble and granite business.

Springwoods, Va.—The Union Marble Company near Saltpetre Cave, in this county, has lately organized with a capital of $25,000. L. C. Parker, manager. They get out fine specimens of onyx and marble and are equipped with machinery for cutting and polishing.

H. C. Dreyer has opened a marble shop at Janesville, Wis.

King & Thompson is a new firm in the marble and granite business at Newcastle, Ind.

Beaver Brook, N. Y.—Charles Bauer and Peter Toussaint have opened a stone quarry which promises to be a very profitable one.

Brandford, Can.—Workman & Elliott, proprietors of Thistle brick yard, announce that they propose adding to their business cut stone, fire brick, fire clay, etc.

Elberton, Ga.—Swift & Wilcox will develop granite quarries in connection with railroad building.

There is a move on foot looking toward the opening of King's Cave stone quarries near Corydon, Ind.

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THE WARDWELL
Steam Stone Channeling and Quarrying Machine

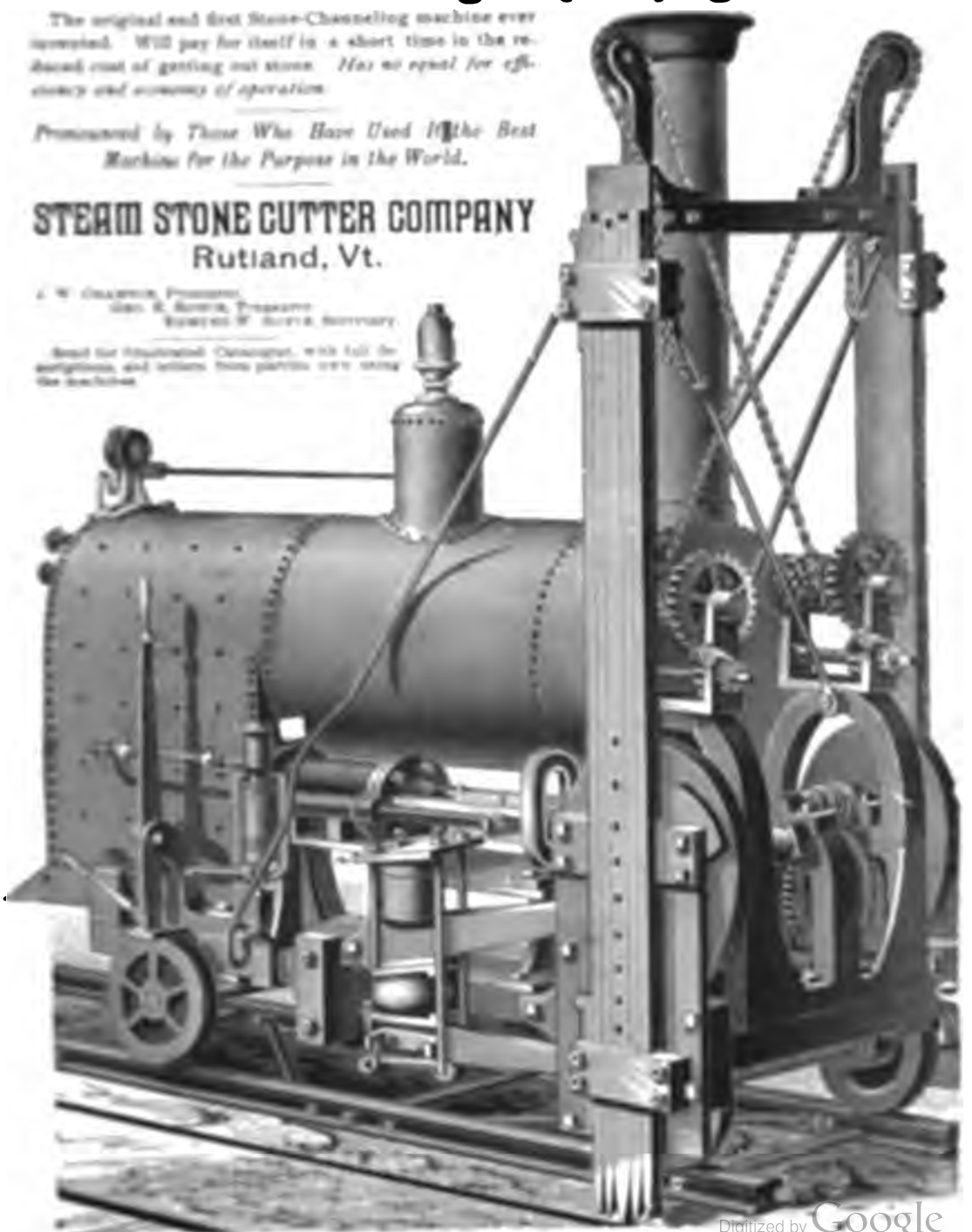
The original and first Stone-Channeling machine ever invented. Will pay for itself in a short time in the reduced cost of getting out stone. *Has no equal for efficiency and economy of operation.*

Pronounced by Those Who Have Used It the Best Machine for the Purpose in the World.

STEAM STONE CUTTER COMPANY
Rutland, Vt.

J. W. CHAMBERLIN, President.
GEO. R. BOWEN, Treasurer.
EDWARD W. BOWEN, Secretary.

Send for Illustrated Circular, with full description, and letters from parties now using the machines.



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Marion, Va.—W. B. Dinsmore, of New York, has opened a limestone quarry.

Pringle, S. D.—A conductor on the Burlington has made a rich discovery near city of onyx, which is found in large quantities, in vertical veins. Samples that have been sent to Philadelphia, Chicago and other eastern cities for the examination of experts have been returned and have been pronounced genuine onyx, and a special value has been placed on the stone because of its light color, which is more in demand than black stone. Preparations are being made to develop the mine extensively.

Albany, N. Y.—M. B. Munson, of Albany, has purchased property and will open a marble yard.

The Schwind Quarry Company, Baltimore, Md., with a capital stock of $30,000, divided into 300 shares. The incorporators are John G. Schwind, Philip A. Schwind, Paul Engelhardt, Charles T. Delaney and Conrad Macke.

Boston, Mass.—The Hadley Marble and Slate Company was organized with a capital stock of $50,000 to carry on a general quarrying business. The paid up capital is $1,000. The incorporators are Charles Hadley and J. Frank Hadley, of Boston; Elbridge G. Kelly, of Peabody, Mass.; Orrin H. Carpenter, of Malden, Mass., Elgin L. McBurney, of Jersey City.

C. M. Holbrook, of Rutland, and J. F. Bigelow, of Brattleboro, Vt., have formed a partnership and are to deal in granite and marble monuments, etc. They have leased a building in Centerville, Vt.

Danville, Ill.—J. H. Palmer and J. H. Shephard, of Chicago, are completing arrangements for putting in a $25,000 stone crushing plant on C. L. Sandusky's Big Spring farm, near Fairmount. The stone to be used is for road building.

Arlington, Mass.—James Patterson, marble works, reported to have recorded chattel mortgage for $300.

The firm of Cline, Mayor & Keith, marble dealers, Hamilton, Ont., dissolved partnership, the latter two purchasing the former's interest. At the time of the dissolution they owed $2,500 and had an unavailable surplus of $1,200. They were granted an extension of time to pay past due wages and some other liabilities. Being unable to carry out this arrangement an assignment followed.

Norfolk, Va.—John P. Hall, marble, reported to have given deed of trust for $600.

Quincy, Mass.—Wollaston Granite Works reported to have made an assignment.

Mankato, Minn.—Mankato Lime and Stone Company reported to have sued to foreclose $3,000.

Rutherford, N. J.—Ernest Ebelhardt, slate, etc., reported to have recorded chattel mortgage for $500.

Barre, Vt.—H. K. Bush, of the Vermont Granite Company, has been appointed receiver for the insolvent firm of Bernasconi & Co., of Plainfield. The liabilities are about $9,000.

Columbus, O.—W. H. Dale & Son, stone yard, reported to have recorded chattel mortgage for $402.

W. T. Crawford and associates, of Shreveport, La., have chartered the Eagle Gap Quarry Company, limited, to develop quarries in Louisiana and Arkansas. Capital, $10,000.

The Barton-Nash Stone Company, Omaha, Neb. The incorporators are Guy C. Barton, Edward W. Nash and Arthur H. Cooley. The capital stock is placed at $30,000. The objects and purposes of the company are to carry on a business in connection with quarrying stone and dealing in sand.

San Francisco, Cal.—Ruffino & Bianchi has been incorporated by C. D. Bianchi, Kate S. Ruffino, William F. Hillegass, Joseph Bianchi, and Geo. T. Sargent, to manufacture and sell ornamental and building stone, etc Capital stock, $150,000.

William H. Bowers will open a new quarry at Bangor, Pa., on land leased from Robert S. Brown, adjoining the quarry he is now operating on David Howell's land. Two hoists will be erected at once.

Allentown, Pa.—The new cement mill at Nazareth, to be erected on land owned by John Maus and Rev. Mr. Smith, will cost $200,000. The capital stock of the company is to be $500,000, half of which has been subscribed in New York, Philadelphia and the New England states. The plant is expected to be in operation by August.

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New York.—The Schneider-Birkenstock Marble Company, of No. 340 East 107th street, made an assignment Jan. 20 to John B. Johnson. Wm. Schneider is president and J. W. Birkenstock treasurer. It was incorporated on July 10, 1894, with a capital stock of $50,000. On Nov. 5 last a judgment for $16,858 was taken out against the company in favor of Charles Schneider for money loaned and merchandise, and execution was issued to the Sheriff, but the matter, it was said, was subsequently adjusted.

The schedule in the assignment of the Schneider-Birkenstock Marble Company, of New York City, show: Liabilities, $17,920; nominal assets, $17,007; actual assets, $6,502.

Sherodsville, O.—The Cleveland Stone Company has purchased the stone on the farm of Jacob Hagey and, it is said, will open a quarry early in the spring.

Pittsburg capitalists have purchased 400 acres of land at Industry, Beaver county, Pa., and will open extensive sandstone quarries. The entire farm will be tested thoroughly for oil and gas.

George Campbell, of Burlington, Vt., and E. W. Stein have opened a new marble shop under the firm name of Campbell & Stein.

Western parties have purchased Peggy's Island, Sullivan, Me., and will open a quarry there in the spring.

A newly discovered granite quarry in Elmwood district, Bethel, Conn., shows a supply apparently inexhaustible and is declared by experts to be of a superior quality. This granite is susceptible of a high polish on every side, can be worked with a pitching tool on all sides, and yet will split the fine way of the grain as easily as Mine Hill stone. The quarry is owned by a Danbury man and the work of development will be started immediately.

The Crown Slate Company, Slatington, Pa., has in contemplation a number of improvements, which when completed will give them the largest and best equipped slate mill and blackboard factory in that section. The intention is to abandon the old mill. A new building, 55x200 feet, will be erected. New machinery will be added, the company intending to have in operation, when everything is completed, seven saws, five planers and two rubbing beds. A large traveling crane will be placed in the building to facilitate the hauling of heavy blocks. The railroad siding will be extended to run within a few feet of the building for its entire length and tracks will be laid into the building so that all loading can be done by means of trucks.

Charleston, S. C.—A. H. Monteith will open a granite quarry.

It is rumored that there has been a company formed for the establishment of a Portland cement manufacturing plant in the vicinity of Mosherville, Mich.

Dick Hall will join his four brothers, who are also stone-cutters, and go into the monument business at Jerseyville, Ill.

Rockville, Conn.—H. T. Anderson and F. A. Watts will open a granite and marble business.

Marquette, Mich.—The property of the Northern Michigan Marble Company, located in the township of Breen, in which A. L. Foster, of Foster City, is heavily interested, will be sold at sheriff's sale on March 15 and 16. The personal property will be sold at the workings of the company near Foster City on the 15th and the real estate at the front door of the court house in Iron Mountain.

Rowena, S. D.—Minnehaha Granite Company reported to have been attached.

Watertown and Gouverneur, N. Y.—Davidson Marble Company reported to have given judgments for $197.

Cincinnati, O.—Louis W. Shaffer, marble, reported to have recorded chattel mortgage for $900; conveyed real estate for $5,500.

Springfield, O.—Israel H. Kelly, monuments, reported to have recorded chattel mortgage for $694.

Thomaston, Me.—Burgess & O'Brien, lime rock; liabilities will not be less than $100,000, with assets of only $38,000.

The Brandon (Vt.) Italian Marble Company, whose mill was recently burned, have leased the Corona Marble Company's mill at Brandon and they will not remove their finishing de

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partment from Brandon, as it was feared they might be obliged to do.

J. C. Maxon, of Sterling, Iowa, has sued the government for $25,000 damages for flooding his stone quarry. The water came from the Hennepin canal.

The Perry, Matthews & Buskirk Company, of Bedford, Ind., havs just closed the largest stone contract in the limestone district. The stone will be shipped to New York City and is intended for a large building to be erected there. Shipments will be made at once.

At the meeting of the Bangor Slate Manufactnrers' Association the prices of Bangor slate were advanced an average of 10 cents a square.

The Hallowell (Me.) Granite Company will build a railroad connecting their quarries at Granite Hill next spring. It will form a loop, running around both quarries and through the sheds, a distance of half a mile. It will be equipped with a steam engine and flat cars provided with steam derricks for loading the cars. The tracks will be laid through the middle of the shed, so as to drop the rough granite on either side and take up the cut stone. The $2,000,000 contract for the Hall of Records at Albany, N. Y., makes this addition necessary. It is thought that before long the railroad may be extended two miles to the sheds in the city.

Rutland, Vt.—The True Blue Marble Company held its annual meeting recently and elected the following officers: President, John W. Cramton; secretary and treasurer, George E. Royce; superintendent, R. W. Smith; directors—John W. Cramton, George E. Royce, Don C. Pollard, B. F. Pollard, A. Wertenberg, Frank Huntress and George B. Royce.

Belle Plain, Iowa.—F. W. Rejahl succeeds Rejahl & Woodruff in the marble business.

Lincoln, Ill.—Mr. Adolph Rimerman, who has been president of the Lincoln Monument Company since its organization, has retired. W. D. Gayle is now at the head of the company, with Mr. Summers as superintendent.

J. W. Barlow, of Rockwell, Iowa, has purchased the stone quarries and coal yard of S. C. Belding and will move to Mason City March 1.

Henry Kohlhagen, proprietor of the Sheboygan Falls (Wis.) stone quarry and lime kilns recently sold out to his son Edward and son-in-law Peter Ingelse, and hereafter the firm name will be Kohlhagen & Ingelse.

Salisbury, N. C.—Mr. J. E. Malloy, contractor, has sold his interest in the granite business ot Edwin P. Culbertson, of Charlotte.

G. Laager, of Carlinville, has bought the marble business of H. F. Nather, of Collinsville, Ill.

Corydon, Iowa.—Niday & Pinkham, marble and granite, succeeded by W. A. Pinkham, who is reported to have recorded chattel mortgage for $1,450.

The Carthage (Mo.) Press says that the Frisco is quietly laying its plans to build a spur to the quarries north of the river, and that two surveys for that purpose have been made, one of which was completed a couple of days ago. It is known that at least one of the quarries north of the river is very anxious to have the Frisco build to it, and it is probable that both are. It is said that both spurs may be built, the east one to reach quarry land near Kellogg's springs likely to be opened up soon. Forty acres there are owned by Mrs. Newell, Dr. Caffee and Mr. Plummer, of Pennsylvania. George Stebbins also owns forty acres. Plans are on foot to open up this land, but nothing definite is at present ready for publication. Dr. Caffee informed a Press reporter that he had the right of way for a Missouri Pacific spur to the quarry land referred to, procured several years ago, and that he expected both a Pacific and a Frisco spur would be built there some day. He thinks it highly probable that a quarry will be opened up on the land in which he is interested between this and spring.

Carthage, Mo.—In reference to the announcement that the Center Creek Stone Company would establish a new quarry, W. B. Myers, local representative for that company, said: "There is no intention to abandon the Center Creek quarry. Geo. Pickel who was here last week told me that this is the best quarry property he owns, and he has interests at Warrensburg, as well as other places in the state. I think that story of abandonment was started by some of our rivals in the stone business." Messrs. Pickel and Stamm have contracted for the stripping of 5,000 yards of earth at Center Creek and expect to use four hundred cars of stone in their building throughout the state this year.

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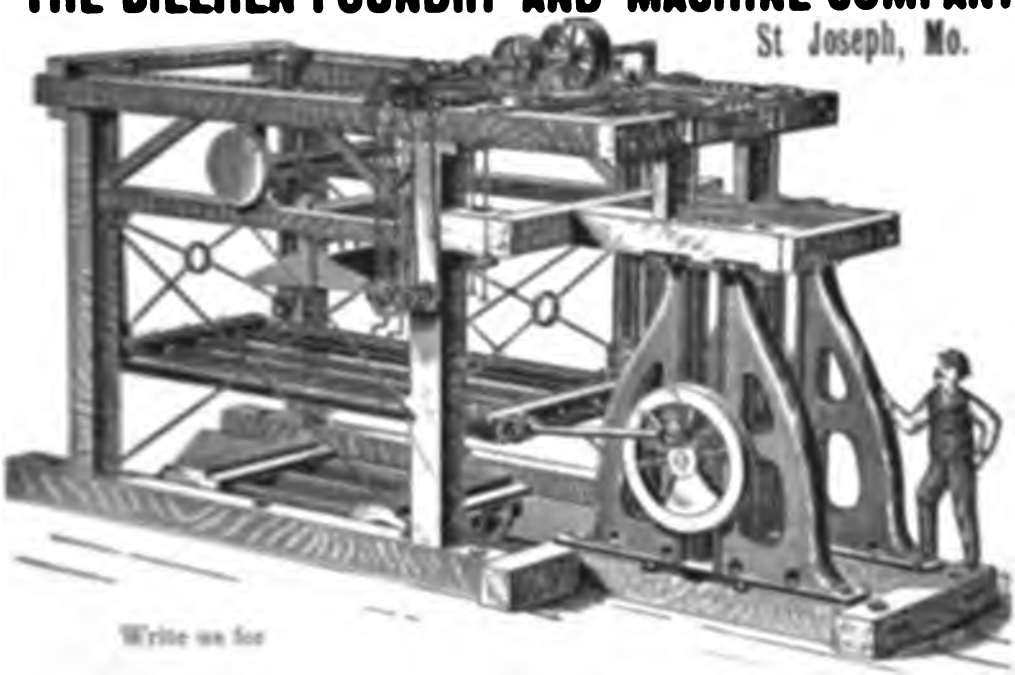
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The Granite Manufacturers' Association of Concord, N. H., at their annual meeting, elected the following officers: President, J. G. Craig; first vice-president, James Quinn; second vice-president, John Swenson; secretary, George Clarke; treasurer, Thomas Fox; executive committee, William Foley, Orrin Swain, Joseph Croteau and Joseph Pierce; arbitrator, James G. Batterson, Jr.; grievance committee, J. G. Craig, Thomas Fox and John Swenson; conference committee, Ola Anderson, John Swenson and Alderman James H. Killeen. The present status of the granite trade was discussed, and the efforts of the Commercial club to bring contracts to this city were approved. The conference committee was appointed to confer with the board of trade and other organizations. It is the purpose of the club to gather data from the quarry roads in Barre, Vt., to apply to Concord. The manufacturers pledge themselves to make special effort to bring to Concord plenty of work.

The mill and several smaller buildings comprising the plant of the Italian Marble Company at Brandon, Vt., were destroyed by fire January 15. The total loss will amount to $21,000. The buildings and their contents were insured for $16,500. The cause of the fire is not known at present. The buildings probably will be rebuilt.

Howardsville, Va.—Mr. Ellwood, manager of the Nelson county marble quarry, has returned from New York, where he went for the purpose of purchasing machinery to run the quarry on a more extended scale. The Chesapeake and Ohio road is expected to put in a side track soon, and the company hopes to put on the market at no distant day some first-rate merchantable marble. Rumor has it that a bed of soapstone of excellent quality has been located in this vicinity, and that it is in the hands of some well-known business men, who expect to have it in operation in a short while.

Since the discovery of marl beds in this vicinity, says the Athens (Mich.) Times, and the building of works for the manufacture of cement, parties from abroad have been prospecting here, and on Monday a great find was made on the farm of James Standiford, two and a half miles southwest of the village and a mile from the railroad. The bed also extends onto the farm of William Lehr. The bed is about one hundred acres in extent, from three to four feet deep, and is pronounced of the best quality. A movement is already under way now, we are informed, to organize a company with a capital of $300,000 to develop and carry on the business of manufacturing cement. It is designed to erect the works in this village. If the project is carried out as designed it will give employment to hundreds of men.

Grand Rapids, Mich.—Read & Beamer, marble, reported to have given chattel mortgage renewal for $200.

Allentown, Pa.—A civil suit was entered in the Prothonotary's office by Frand Hederwich against the Cambridge Slate Company, for $25,000 damages for alleged injuries received in the quarry of the defendant corporation. About six months ago, it is claimed, Hederwich was caught in a slide in the quarry and terribly injured.

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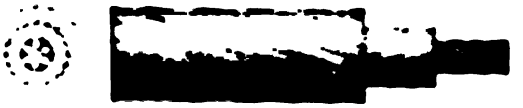
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L. S. Cohn, of Wausau, Wis., has leased his granite quarries to a gentleman from Richland Center, Mr. Fred DeVoe, and they will be operated by a company known as the Fred DeVoe Granite Company. The granite in that vicinity is of excellent quality, and it is expected that the development of a valuable industry will result from this arrangement.

The Victor Stone Company of Bloomington, Ind., capital $100,000. The directors are J. W. Jackson, D. H. Maxwell and J. B. Crofton.

The Bartoli-Schoone Mosaic and Marble Company, Cincinnati, O. Capital stock $6,500.

The Wawatosa (O.) Stone and Quarry Company filed articles of incorporation. The capital is $30,000, and the incorporators Frederick Kraus, Willibald Hoffman and Henry Wissbeck.

Detroit, Mich.—The C. H. Little Company, lime, stone, etc., has been incorporated.

Shreveport, La.—The Eagle Gap Quarry Company, Limited, has been incorporated, with John T. Talbot treasurer. Capital stock $10,000.

Articles of incorporation of the Catskill (N. Y.) Quarry Company, which is organized with a capital of $10,000, have been filed. The incorporators are William N. Johnson and Henry A. Sharper, of Palatine Bridge; T. H. Riddle, of New Brunswick, N. J.; B. G. Jayne, of New York, and Samuel Randall, of Catskill. It is the purpose of the company to operate a stone quarry situated a short distance southwest of the quarry owned and operated by George W. Holdridge. The company is said to have contracts on hand to supply stone for the Erie canal improvements and other important public works which call for 82,000 yards of stone, and operations on a large scale will soon be commenced.

Baltimore, Md.—Edward R. Berry and Samuel E. Tracey advertise that they have formed a partnership under the name of Berry & Tracey to conduct the granite and bluestone business heretofore conducted by Mr. Berry.

Bergen, N. Y.—The cement company, which has been for some time contemplating the locating of a plant just northwest of this village, report that the needed capital is all subscribed and the industry is an assured fact in the near future.

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FIG. 83.—OSGOOD DIPPER DREDGE, NEW YORK STATE CANALS.

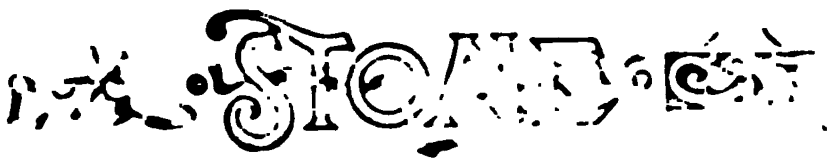
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FIG. 83.—OSGOOD DIPPER DREDGE, NEW YORK STATE CANALS.

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The pumps used at the present time on very small work are usually square wooden box lift pumps, such as are used on large river barges, and are worked by one or more men lifting on a plunger. These are often replaced by a similar pump of metal (Figs. 69 and 70) with a tube of galvanized metal, and often spiral riveted. The one shown in Fig. 69 has the top and bottom soldered to the tube, while the one in Fig. 70 has screw joints. The cost of a 4-inch pump eight feet long with fixed top and bottom would be about $6, while the screw joints would about double the cost.

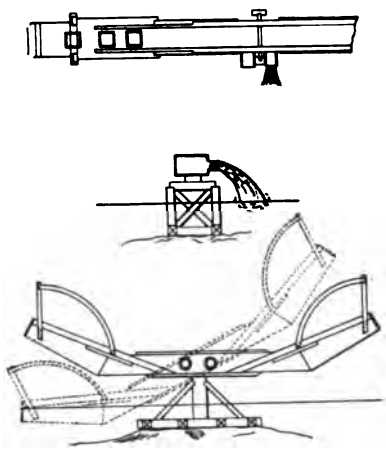


FIG. 66.—OLD BASCULE PUMP.

Such pumps are, however, little used, as the labor becomes excessive where there is any quantity of water to deal with, and diaphragm pumps (Fig. 71) are employed, which work on a rubber diaphragm, in place of a piston and plunger, and throw a large amount of water, besides allowing the passage of sand and gravel without choking the pump. The 2½-inch suction has a capacity of twenty-five gallons per minute, and the 3-inch suction of fifty-eight gallons per minute, the list price of the two sizes being $20 and $26, respectively; the maximum lift of the pump being thirty feet.

Where steam can be obtained steam siphons are often used, the steam being introduced into the main pipe through a nozzle, thus causing a suction, which with a 3-inch discharge Van Duzen jet will deliver 7,200 gallons of water per hour, the height of the pump above water being 11 feet, the point of discharge being 19 feet above the pump, making a total lift of 30 feet. This size will require an 18-horse power boiler and a steam pressure of fifty pounds. The suction pipe is one inch larger than the discharge, while the steam pipe is 1¼ inches in diameter, with a jet opening of about $\frac{13}{16}$ inches.

The list price of a pump of this size (Fig. 72) is $36, the piping being extra. The pump is constructed of gun metal and will last indefinitely. The strainer should always be used and will cost about $4 extra for the 4-inch pipe. The piping should have long bends in place of elbows where a turn is required.

This make of pump is manufactured from ½-inch discharge, with a capacity of 200 gallons per hour, up to 5-inch discharge with a capacity of 12,000 gallons per hour. The smaller sizes are useful for priming centrifugal pumps and for a variety of uses around a contractor's plant.

The Lansdell siphon pump (Fig. 73) has a double suction C C, to which

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FIG. 69.—HAND PUMP. SOLDERED JOINTS.



FIG. 70.—HAND PUMP. SCREW JOINTS.

clearing it of water by forcing it into the discharge chamber shown in dotted lines. The steam then condenses at once and the ball C changes its seat, closing the right hand and opening the lett hand chamber to the steam. The vacuum, formed by the steam condensing in the right hand chamber A, allows it to fill with water by atmospheric pressure through the suction pipe at the extreme bottom and through the chamber D, it being retained by the valves E E. The steam then enters the left hand chamber A and the operation is repeated. The chamber J is a vacuum chamber.

In starting the pump the steam is turned on for three or four seconds, then shut off for four or five seconds, alternating these movements until the pump is started. The steam is then turned on about half or three-quarters of a revolution, the two side air valves opened about half a turn, and then the middle air valve opened slowly until a regular stroke is obtained.

The capacity of the 3-inch discharge, with a ½-inch steam pipe and operated by a 9-horse power boiler, is 180 gallons per minute when the lift is as much as twenty-five feet; and for the 6-inch discharge, with a 1½-inch steam pipe and operated by a 35-horse power boiler, 1,000 gallons for the same lift.



FIG. 71.—DIAPHRAGM PUMP.

The pulsometer is remarkably smooth in operation, and except for the slight click of the ball and the discharge of water in a steady stream, one would scarcely know it was pumping. Where a good-sized hoisting engine boiler is in use on foundation work, it can be used to supply the steam for pumping. The work illustrated in Fig. 4 was easily kept free of water by a small pulsometer,

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FIG. 74.—PULSOMETER STEAM PUMP.

from the use of a belt being done away with, and no loss of power through slipping of belts. The machine can be placed on the barge which carries the boiler, the suction pipe being run horizontally across as in Fig. 56, while a short discharge pipe discharges directly into the river. Where electric power plants are available a still better arrangement will be to have an electric motor directly connected to the pump, and all the trouble incident to the use of a boiler on the work will be avoided.

shown by a German pump with a 9¼-inch discharge, a 10.3-inch suction, and a 20.5-inch disk, running at 500 revolutions. The lift was 16.46 feet and the efficiency 73.1 per cent!

That such results are not realized on actual work is readily understood when it is considered what little care is used to properly place and operate such a plant, how little attention is paid to having a proper boiler and engine, and what lack of care there often is to keep the plant in good repair.

An ideal outfit for operating by steam is shown in Fig. 76, where the engine is directly connected to a Heald & Sisco pump. All the trouble and vexation



FIG. 75.—SECTION OF PULSOMETER.

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strainer or end of the suction pipe is usually placed in the lowest point, and sometimes a box or sump is provided, as a well into which the water is drained from the other and higher portions of the work. A small set of falls should be attached to the foot to raise the pipe and clean out the strainer when necessary.

The centrifugal pump itself must be in first-class repair to do economical work, and must be of a large enough size so that it need not be run beyond its economical capacity. The style of pump to use will depend upon the work to be done, but for coffer-dam work a vertical pump could not be used easily and need not be considered. Where practically clean water is to be pumped an ordinary style of pump should be used, but where much mud or sand will be drawn up a sand pump is best; and where a large part of the excavation is to be done with the pump, as at Topeka, a dredging pump will be the proper type.

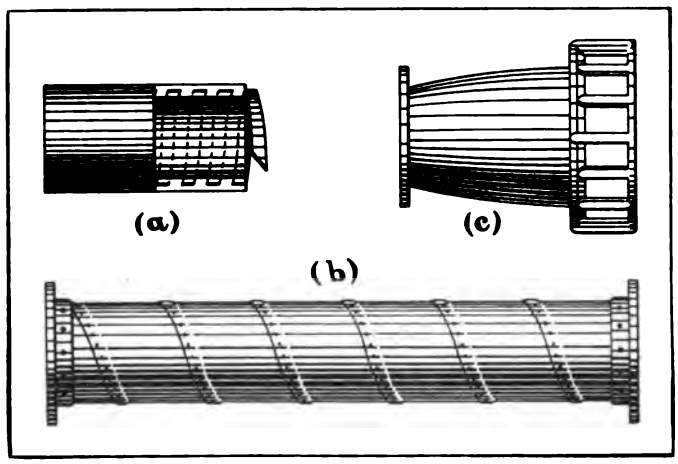


FIG. 77.—SUCTION DETAIL FOR PUMP.

The pumping required on the Chattanooga work, 5,000 gallons per minute to a height of about fifteen feet, would have been done most economically by a 15-inch pump, with a 40-horse power engine and a 50-horse power boiler. But a pump of this size would not find ready use in a contractor's work, and for this reason two 8-inch pumps would have been the better outfit to purchase, unless the work was very extensive; and each pump should be provided with a 25 or 30-horse power engine, so as to run the pumps somewhat beyond the economical capacity, which could readily be done with a direct connected engine, where there would be no belt to slip.

The work required on the Forth bridge coffer-dams could also be done by the 15-inch pump above described, the lift being about 3 feet at the start

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end thrust on the bearings. This pump is most easily primed by using an ejector, or a flap valve such as is shown on the discharge pipe of the dredging pump (Fig. 79) and which serves to retain the water in the pump. Where a long discharge pipe is to be used, a quick closing gate valve may be introduced into the pipe near the pump.



FIG. 80.—DREDGING PUMP PISTON.

Where the material to be dredged out at the foundation site is mud or sand or partly gravel, it can be removed during the process of pumping by using a dredging pump. In case there were 700 yards of material to be removed and an 8-inch pump was provided, it would not be advisable to count on more than 10 per cent. of solid matter being discharged by the pump, as the suction could not be kept working close up to the sand or mud. By using a 30-horse power engine, a discharge of 2,000 gallons per minute would be reached, or with 10 per cent of loose solid matter, the excavation would be made in less than two working days.

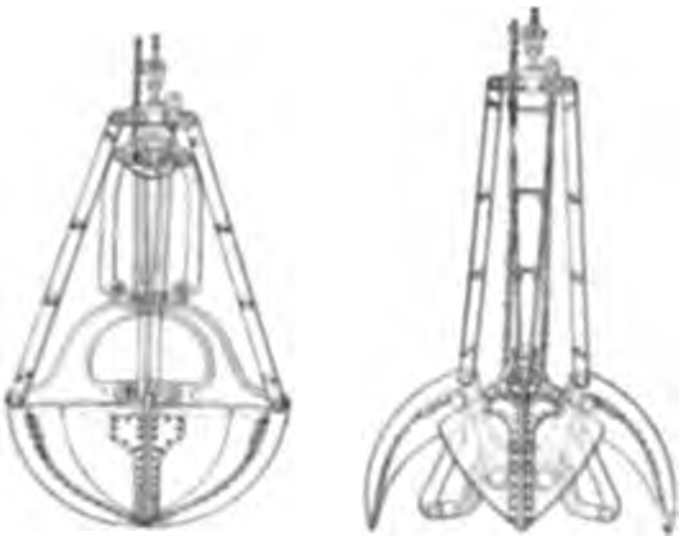
The piston of a dredging pump (Fig. 80) is provided with large openings to receive the material, and the one illustrated is provided with side plates so that all wear is taken off the pump casing.

One of the most remarkable pieces of work done with this class of pumps was the use of Edwards' Cataract pumps in dredging the ship channel in New York harbor. This is described in the Trans. Am. Soc. C. E., Vol. 25. The work was done by three dredges, which were much the same as small sea-going vessels, the largest being the Reliance, 157 feet long, and carrying 650 cubic yards of dredged material. Two separate pumps were provided, each with 18-inch suction pipes, reaching from the sides of the vessel and parallel to it down to the bottom to be dredged, being supported by suitable hoisting tackle. These boats were kept under headway toward the dumping ground while the dredging was in progress. The average load during about a month's working of the Reliance was 585 cubic yards and the average time of loading about 48 minutes, while the average number of loads per day was 6.73.

These dredges removed the enormous quantity of 4,299,858 cubic yards of material at an average price of 24.48 cents per yard, the lowest price being about 17 cents, the average price paid for other forms of dredging being

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per day, with only two men to attend it, and will use less than one-half ton of cheap coal, the total cost per yard thus running below five cents. Large elevator dredges of this type are very elaborate affairs, and as they are in wide use they can often be hired for making excavations.

The best known form of dredge, perhaps, is the dipper dredge. The Osgood machines (Figs. 83 and 84) in use on the New York State canals are among the best machines of this kind in use. Such dredges are more simple in construction than elevator machines, and are consequently easier and cheaper to keep in repair. The hull is 70 x 17 x 6 feet with two 6-feet pontoons which are removed when going through locks. The engines consist of a double drum main engine with 8x10 inch cylinders, a swinging engine with 6x8 inch cylinders, and a crowding engine, 5x6 inch cylinders, which are all used in operating the digger of 1¼ yards capacity on a steel boom 45 feet in length.

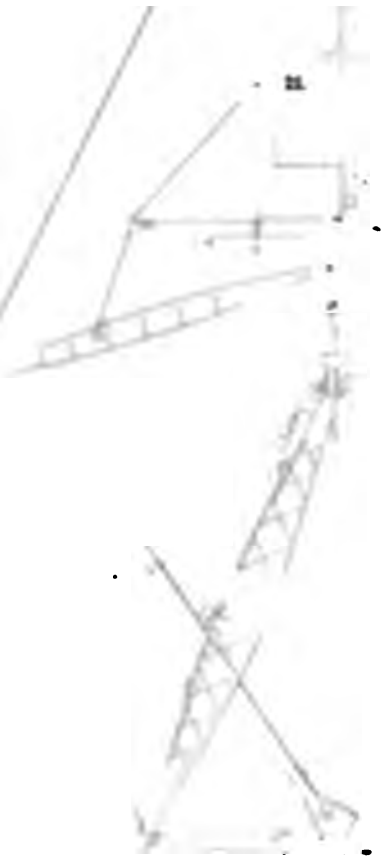


FIG. 82.—SAND DIGGER.

The crowding engine is used to control the dipper and enables it to make a practically level bottom at one cut, and also thrusts the dipper far enough beyond the boom to allow it to dump fifty-two feet from the center. This dredge, which cost complete $10,000, is operated by a crew of only four men and consumes but one ton of coal per day of twelve hours, the average excavation during four months' work being 549 cubic yards per day. The machine has sufficient power to dig hardpan, boulders, and very soft shale rock.

A dredge of this make, of 3½ yards capacity, working in mud and sand, has dug material at the very low actual cost of .99 of one cent! This of course was an exceptional case, and the cost will rarely fall below five

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FIG. 74.—PULSOMETER STEAM PUMP.

from the use of a belt being done away with, and no loss of power through slipping of belts. The machine can be placed on the barge which carries the boiler, the suction pipe being run horizontally across as in Fig. 56, while a short discharge pipe discharges directly into the river. Where electric power plants are available a still better arrangement will be to have an electric motor directly connected to the pump, and all the trouble incident to the use of a boiler on the work will be avoided.

shown by a German pump with a 9¼-inch discharge, a 10.3-inch suction, and a 20.5-inch disk, running at 500 revolutions. The lift was 16.46 feet and the efficiency 73.1 per cent!

That such results are not realized on actual work is readily understood when it is considered what little care is used to properly place and operate such a plant, how little attention is paid to having a proper boiler and engine, and what lack of care there often is to keep the plant in good repair.

An ideal outfit for operating by steam is shown in Fig. 76, where the engine is directly connected to a Heald & Sisco pump. All the trouble and vexation



FIG. 75.—SECTION OF PULSOMETER.

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strainer or end of the suction pipe is usually placed in the lowest point, and sometimes a box or sump is provided, as a well into which the water is drained from the other and higher portions of the work. A small set of falls should be attached to the foot to raise the pipe and clean out the strainer when necessary.

The centrifugal pump itself must be in first-class repair to do economical work, and must be of a large enough size so that it need not be run beyond its economical capacity. The style of pump to use will depend upon the work to be done, but for coffer-dam work a vertical pump could not be used easily and need not be considered. Where practically clean water is to be pumped an ordinary style of pump should be used, but where much mud or sand will be drawn up a sand pump is best; and where a large part of the excavation is to be done with the pump, as at Topeka, a dredging pump will be the proper type.

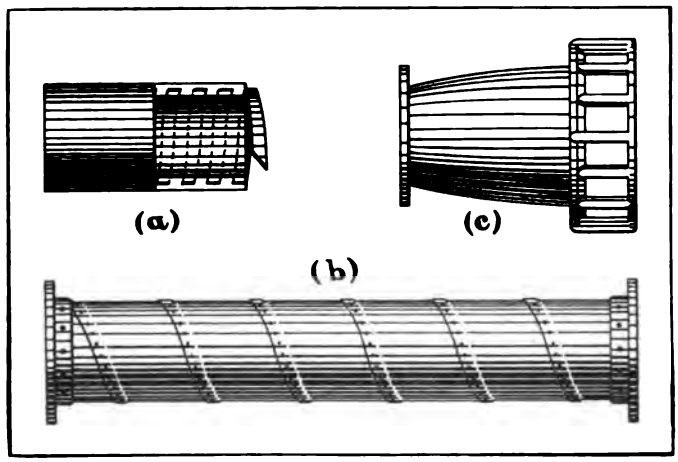


FIG. 77.—SUCTION DETAIL FOR PUMP.

The pumping required on the Chattanooga work, 5,000 gallons per minute to a height of about fifteen feet, would have been done most economically by a 15-inch pump, with a 40-horse power engine and a 50-horse power boiler. But a pump of this size would not find ready use in a contractor's work, and for this reason two 8-inch pumps would have been the better outfit to purchase, unless the work was very extensive; and each pump should be provided with a 25 or 30-horse power engine, so as to run the pumps somewhat beyond the economical capacity, which could readily be done with a direct connected engine, where there would be no belt to slip.

The work required on the Forth bridge coffer-dams could also be done by the 15-inch pump above described, the lift being about 3 feet at the start

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end thrust on the bearings. This pump is most easily primed by using an ejector, or a flap valve such as is shown on the discharge pipe of the dredging pump (Fig. 79) and which serves to retain the water in the pump. Where a long discharge pipe is to be used, a quick closing gate valve may be introduced into the pipe near the pump.



FIG. 80.—DREDGING PUMP PISTON.

Where the material to be dredged out at the foundation site is mud or sand or partly gravel, it can be removed during the process of pumping by using a dredging pump. In case there were 700 yards of material to be removed and an 8-inch pump was provided, it would not be advisable to count on more than 10 per cent. of solid matter being discharged by the pump, as the suction could not be kept working close up to the sand or mud. By using a 30-horse power engine, a discharge of 2,000 gallons per minute would be reached, or with 10 per cent of loose solid matter, the excavation would be made in less than two working days.

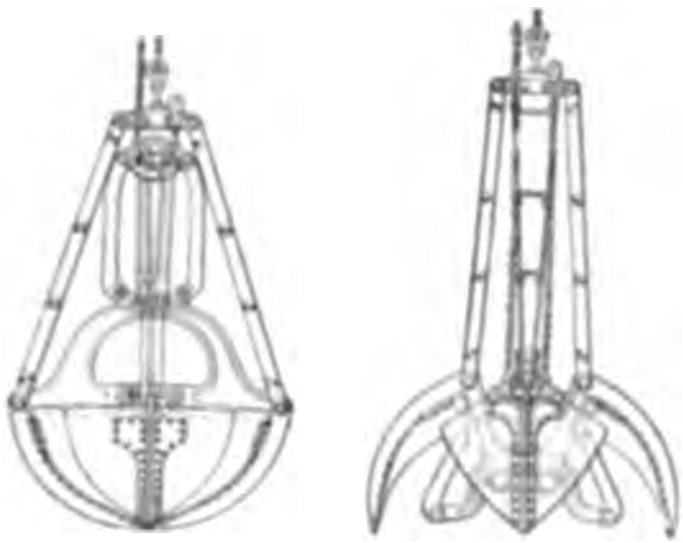
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FAMOUS SINGLE STONES.



THE lasting qualities of stone have always made that material a favorite one for the purpose of perpetuating the memory of some great event or some great name; and these same qualities have also done much to connect past history and events with the present time. Perhaps the first historical stone of importance we read of is the stone Jacob set up in Bethel after his dream of the ladder and the angels. "And Jacob woke up early in the morning, and took the stone that he had put for his pillow, and set it up for a pillar, and poured oil upon the top of it." (Gen. xxvii. 18.) The custom of placing stones to mark boundary lines or points, and over spots of earth where some great event occurred, is older than history, but with regard to this particular stone there are many traditions that have come down to us from the preceding centuries.

According to several writers, this particular stone is now in Westminster Abbey and is built in the coronation chair where it was placed during the reign of Edward I. The story is that at the captivity of the Jews the stone was carried to Spain by the prophet Jeremiah, who escaped to that country with two of the daughters of the captive king. One of the daughters married a Milesian prince who took her and the stone to Ireland. Here for nearly a thousand years the stone remained and was part of the royal outfit at Tara, and was known as the "Stone of Tara" for many generations. Tradition endowed this stone with many wonderful qualities while owned by the Irish royal family. The stone, it is said, was carried to Scotland and for several centuries the Scottish kings were crowned over it. It was then known as the "Stone of Scone," Scone Abbey being the place in which it was kept.

From this point on the history of the stone may be considered reliable, for whatever may have been its precious wanderings it now appears in the full light of tangible history. It was there encased in a chair of wood, and stood by a cross in the east of the monastic cemetery, on or beside the "Mount of Belief," which still exists. In it, or upon it, the kings of Scotland were placed by the earls of Fife. From it Scone became the "*sedes principalis*" of Scotland, and the kingdom of Scotland the kingdom of Scone; and hence for many generations Perth and not Edinburgh, was regarded as the capital city of Scotland.

On this precious relic Edward fixed his hold, but before removing the stone caused himself to be crowned King of the Scots on it, after which,

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[illegible] Westminster Abbey [illegible]

***

[illegible] Egypt [illegible] Egyptian [illegible] [illegible] [illegible]

Emilion, which contains a church carved entirely out of one piece of solid rock, and is of early Romanesque character. This church was made sometime during the eleventh century—precise date unknown. It is 115 feet long by 80 feet wide. It consists of three parallel aisles, or rather a nave and two aisles, with plain, barrel-shaped vaults (if they can be so called) with transverse vaults or openings, and round arches on massive square piers. The imposts are of the plain early Norman character, merely a square projection chambered off on the underside, but one of them is enriched with the billet ornament. There are recesses for tombs down the sides, and a fourth aisle or passage has been cut out on the south side, apparently for tombs only, as it has recesses on both sides to receive stone coffins. Still further to the south, but connected by a passage, is a circular chamber in an unfinished state, with a domical vault and an opening in the center to a shaft which is carried to the surface. Whether this was intended for a chapter-house or a sepulchral chapel in imitation of the Holy Sepulcher, is an undecided point. The church is lighted from one end only, where it is flush with the face of the rock; and these openings are filled with flamboyant windows which are evidently much younger than the church. The tower or spire of the church is quite independent of the main building and is late Norman in style.

Adjoining the church on the south side is a small chapel also carved from the native rock, and is in Norman transition style. It has an apse vaulted with firm ribs and vaulting shafts all cut from the solid. Under the chapel is a crypt or cave cut out of the rock, called the Grotto of St. Emilion, with a spring of water in it. The work is of the same early character as the other work.

***

There is a stone in Corea often mentioned by travelers as being one of the most wonderful things to be seen in that strange land. This stone is called the floating stone. It is of great bulk and shaped like an irregular cube. To all appearance it is resting on the ground and is perfectly free from support on any side. If two men standing at opposite ends of it hold each the opposite end of a thread they will be able to pass the thread under the stone without encountering any obstacle. The natives consider this stone as one of their greatest national possessions, and at one time it was an object of adoration and was consulted as an oracle, and even now it has a temple erected in its honor and which is known as the Temple of Fon Shih Miao, or the "Temple of the God of Mystery."

***

There is in the Church of St. Nicaise, city of Rheims, a pillar which sways perceptibly with the ringing of one of the bells of the tower. When this particular bell is rung it causes the top of the pillar to sway to the

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extent [illegible] even in the case of each bell although the base of the pillar is immovable and the stones are so firmly cemented as to seem like a solid piece of masonry. Although each of the four bells in the tower is about the same distance from the trembling pillar, only one of them has any effect upon it, the ringing of the others either singly or all together not causing it to tremble in the least. When a board was placed on the pillar, bearing two glasses of water and the bell was rung at the fifth stroke of the bell the two glasses were thrown off. Curiously enough it was an adjoining pillar that [illegible] swayed them it became immovable and after a time the present pillar began its eccentric and mysterious behavior. Scientists who have looked into the matter have given a number of theories regarding the movement, but no satisfactory reason for it has yet been advanced.

Fred F. Hall.

WHAT A STONEMASON MUST DO TO ENTER THE GOVERNMENT SERVICE

THE United States Government is the employer to a large extent of [illegible] whose parents have been in [illegible] the classified service [illegible] what is known as the fourth grade of the trades class. Any man who desires to enter the department service of the Government to pursue his trade must go through certain formalities in the way of application and examination. By the latter term which has a formidable sound is meant [illegible] the Civil Service Commission stating the qualifications of the applicant and he leaves it [illegible].

The first step, which must be to the Civil Service Commission in Washington, is to make an application which is called Form No. 1312. This will be sent at once by the Commission to the applicant. Form No. 1312 will [illegible] be sent. This is the examination blank which must be filled out and returned to the Commission within ten days after receipt of blank. Three references are required and the applicant is made a strong warning against [illegible]. The examination blank is in reference to the trade the applicant [illegible]

[illegible] is a statement of the methods by which an applicant for a [illegible] may secure examination. The rules in the examination [illegible]

An applicant must be over 21 and not more than 45 years of age [illegible] a man [illegible] 21 years of age. All who are less than 21 or more than 45 years of age [illegible] are barred from examination.

[illegible] Applicants will be required to furnish such information as to the qualifications which the applicant [illegible] has a [illegible] as a stonemason and he will be [illegible] [illegible] in connection with his trade. The rates of marking are [illegible] quality, [illegible] and industry and are each of the three cases [illegible] average [illegible] an average [illegible]

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Experience.—An applicant who has served the regular apprenticeship of his trade, and has thus acquired the status of journeyman, will be marked 70 for experience. For each full year's experience as a journeyman, to and including two years, he will be marked 10, in addition to 70, and for each full year's experience over two and not exceeding seven years, he will receive 2, in addition to 90. For seven or more years' experience as a journeyman a maximum mark of 100 will be given.

Physical Qualifications.—An applicant whose application and vouchers show him to have no physical defects or disqualifications, for the practice of the trade for which he desires to be examined, will be marked 100 for physical qualifications. An applicant who appears to have any physical defect which will impair his efficiency will have a proportionate deduction made from 100 and the remaining mark will be his mark for physical qualifications.

When the foregoing qualifications are considered the relative weights of the marks will be: Age, 1; character as workman, 4; experience, 4; physical qualifications, 1, making a total mark to be desired for appointment, 10.

In some cases it is thought best to give in addition to the questions on the blank form a general intelligence test. This is of such a nature that any mason of average intelligence and information may easily pass satisfactorily.

The foregoing directions are for the benefit of masons who desire to enter the departmental service in Washington. There are other branches of the service, however, in which such artisans are employed, such as the Engineer Department service, which has different headquarters all over the United States, and the Navy Yard service. Any mason who desires to enter the Engineer Department service must comply with the same regulations as those who wish to enter any departmental service, with the exception that application for the blank forms to be filled out should not be made to the Civil Service Commission in Washington, but should be addressed to the secretary of the local board of U. S. Civil Service Examiners at the headquarters of the engineer district in which employment is desired. If the person who desires to enter the service is in doubt as to the whereabouts of the headquarters, he will receive full information on the subject if he addresses a letter of inquiry to the Civil Service Commission in Washington.

The employment of artisans, mechanics and laborers at each of the navy yards and stations is now in the hands of what is called "The Board of Labor Employment." At the navy yards a large force of men are employed, among whom are a number of masons. To obtain employment at a navy yard a mason must ascertain the names of the officers on this Board and make his application to them. The officers of the Board are the captain of the yard and the two officers in charge of the two departments

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world's history, in the largest number of men

No man's age can be determined if it can be proved that he was a citizen of the United States that he was born within the age limitation required that he is physically qualified that he is entitled to the name of a living person to express, that he has been discovered in the public records of the government of the United States a year preceding his age that he has made any false statement in connection with his age that he has been guilty of crime or misdemeanor in the United States

Whenever an assignment is made it is generally that is the assignee receives the amount at the end of which time the shares are not entitled to be deemed if they are entitled to the receipt of the assignment

SCIENTIST EXPLODES THE MYSTERY OF THE PYRAMIDS

PROF. J. D. MCGUIRE of the United States National Museum astounded with a startling statement gave a representative of the Associated News. He said that he would prove that the great pyramid in less time than was required to build it, and that the great stone of stone and mortar and with the aid of modern machinery and appliances. He demanded only an equal number of workmen, and the same implements that the ancient builders had at their command.

In the announcement of which have he declared that what has long been to be a mystery is merely a question of time and labor. He took the measurements of the great pyramid of Cheops and by a mathematical process which he explained, arrived at the conclusion that it was originally intended as a tomb for the king whose name it bears, and that it was never used for that purpose. It was to prove his position that he undertook to duplicate the structure. He said that the great pyramid was built by a race of people who had a knowledge of mathematics and astronomy far in advance of the present day. The measurements he has made show that the builders had a knowledge of the earth's dimensions and of the distance from the earth to the sun which is only recently known to the present day astronomers. The pyramid was built by a race of people who had a knowledge of mathematics and astronomy far in advance of the present day. The measurements he has made show that the builders had a knowledge of the earth's dimensions and of the distance from the earth to the sun which is only recently known to the present day astronomers.

Professor McGuire says that the great pyramid is the largest work of man's hands in the world. It is more than twice as large as any other structure ever erected by human hands. It has been a puzzle to the world for centuries. It has been the subject of much speculation and many theories have been advanced as to its purpose. It is now known that it was built as a tomb for the king whose name it bears, and that it was never used for that purpose. It was built by a race of people who had a knowledge of mathematics and astronomy far in advance of the present day. The measurements he has made show that the builders had a knowledge of the earth's dimensions and of the distance from the earth to the sun which is only recently known to the present day astronomers.

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opposite ancient Memphis, which town was located ten miles below Ghizeh, on the west bank of the river. Ghizeh, where the great pyramid stands, is practically a part of Cairo, being on the west bank and across the river from the latter city. Thus it appears that the location of the pyramid of Cheops is across the Nile from the quarries, and ten miles lower down the stream. Accordingly the blocks of stone had to be loaded upon rafts and floated down the river to Ghizeh, where they were disembarked and conveyed overland a short distance to their destination.

Of course, the work was gigantic; but it must be remembered that men were at hand in unlimited numbers for the use of the Pharaohs of ancient Egypt, and the saving of labor was no object. Vast numbers of war captives, enslaved as such, were available for service of this kind, and indeed the entire native people—barring the priests, who absorbed all the wealth, and had all the knowledge—was scarcely better off. From the countless pictures of themselves which they left behind it appears that they were an austere set of chocolate-brown men, wearing little or no clothing besides a kilt of white linen cloth, with necklace of blue and white glass beads. They always wore moppy, fuzzy wigs; for the wig was a great institution in ancient Egypt. Everything was done on a great scale by the multitude for the use and benefit of a monarch, who ruled with a rod of iron. There was no idleness—no escape from work even by the weak and maimed. If anybody failed to give the required amount of labor, he was beaten unmercifully.

The quarries of Turra are of a fine white limestone, and it is of this material that the great pyramid at Ghizeh is built. The exact method by which the rock was got out is a matter of speculation necessarily, but Professor McGuire believes that it was accomplished in a most primitive manner. In the absence of dynamite or other explosives, the ancient Egyptian quarrymen were obliged to cut deep grooves in the rock and insert big pegs of wood at short intervals. Then they had only to pour water on the wood, the swelling of which split away the stone in huge blocks. This is a method of quarrying practiced occasionally even at the present day, and it is effective with the hardest kind of rock.

There is no reason for being in the dark as to the method adopted by the old Egyptians for transporting the blocks of stone, once they were quarried out. The whole business is shown as clearly as possible in monumental pictures, which have been perfectly preserved, and these are exhibited by Professor McGuire in proof of his theory. The blocks were loaded upon big sleds, and as a road for these vehicles a track of beams or joists placed transversely was laid. Over this track the sled, carrying the stone block, was drawn, with the help of rollers, and with occasional "boosts" from behind by a gigantic lever. Of course, any weight whatever may be pulled

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under such conditions on a sled if enough men are at hand to do the pulling, and at this place there was no limit. Labor in ancient Egypt was not cheap, and workers were innumerable.

The pictures on the monument, showing such great stones in process of transportation, are most interesting. They exhibit immense numbers of men in the act of pulling the sleds on which are loaded the blocks of rock (on the smaller blocks are "lugs," or projections, left purposely for the attachment of the hempen ropes). Perched on the front end of the sled, in each picture is seen the figure of a man, who is giving orders. He is shouting to the men: "Heave, ho! heave, ho!" and encouraging the rowers.

Immediately in front of the sled are men who are busy laying fresh rollers to help things along, while in the rear other men are manipulating a great beam that serves as a lever to lift the sled behind. Meanwhile with goad and shout pullers-men who walk on both sides keep the mass from swinging too much either way. Many other men carry bundles of rollers in their arms, and others yet drag carts on which huge rollers are loaded. Soldiers armed with swords and staves are placed at intervals in the ranks of workmen, urging them on with threats and blows. Water carriers bear jars of that liquid refreshment, and a fellow goes ahead to that duty pours out upon the track in front of the sled to grease it.

It was in this way that the blocks of stone from the quarries at Turra were carried down the Nile bank and there they were loaded upon rafts which conveyed them ten miles down the river and to the opposite bank at Gizeh. There they were unloaded upon sleds again and dragged in the manner already described to the site of the pyramid. Perhaps Mr. Somers thought it likely that the cutting and loading of the great stone he was examining had been done by workmen who were slaves. This would have been easily managed, and would have made no difference at that time. Or, it may have been a stone which had been dragged to a spot near the pyramid but had never been used.

While the workmen were at their noonday meal the visitors were picking away at the stone with their hammers and chipping at it with their knives, which it was easy to do, as the Nile sand and mud had not yet covered the river bank at Gizeh to its final depth of sixty feet. In this way they were able to get a fair enough idea of the quality of the stone to determine whether it was the extra hard or extra soft variety. The result of their examination was that they could not agree, for Mr. Somers thought it was the extra hard, while Mr. Bates thought it was the extra soft. Thus the stone which was used at the pyramid is left undetermined, and will be so until some one shall come along who can tell us.

Speculations of this sort, relating to facts long past, are very likely to be fruitless. How the stones were hauled up to the pyramid was the question

originally 481 feet high—nearly as tall as the Washington Monument—and it seemed obvious that its builders must have been acquainted with important principles of engineering in order to solve such a problem. But Prof. McGuire finds a way of getting over the difficulty that is both simple and easy. He declares that there is only one way in which the thing could have been accomplished, and that that was a method well known to the ancients. It was by means of an inclined plane that the stones were raised.

Suppose that the Washington Monument was yet to be erected, and that there were no such contrivances available as derricks, steam hoists, pulleys and other modern mechanical inventions. How would the engineer manage? There is but one conceivable method that he could adopt, and that would be to build an inclined plane of earth or other material, up which the stones could be dragged and pushed by main force. Such an inclined plane would have to be half a mile—perhaps a mile—long in order to make an altitude of 500 feet obtainable, with a practicable grade. But if that were the only way it would have to be adopted, no matter how gigantic the labor involved.

This then is the solution of the puzzle of pyramid building. It was the method adopted in the construction of all the pyramids, and several of them rival in size the so-called great pyramid, supposed to have been put up by King Cheops, otherwise known as Suphis, who reigned at some time between 5,000 B. C. and 2,000 B. C. Nobody knows the date more accurately.

Mr. Flinders Petrie, the famous Egyptologist, has declared that the Egyptians of 5,000 or 6,000 years ago made use of tubular drills, the art of using which has only recently been rediscovered. These drills were of bronze, which metal, by the aid of an art since lost, they had learned to harden so that it did the work of steel. The implements were set with sapphires, as modern drills were set with diamonds, for cutting stone. They had bronze saws, too, similarly hardened, and provided with sapphires for teeth, to cut stone; and there is even satisfactory evidence, according to Mr. Petrie, that they employed circular saws, likewise gemmed. Some of the drills were five inches in diameter, and must have required a pressure of one or two tons when used. The reason why none of these drills and saws has been found in the ruins is that they were royal property, and, as such, were carefully preserved by the Pharaohs.

Professor McGuire, with the cold-blooded hammer of demonstrable fact, knocks to flinders all of these attractive theories of Mr. Flinders Petrie. He admits that the ancient Egyptians knew the use of the tubular drill; nobody would attempt to deny that. But, inasmuch as such a drill of soft bronze, or even of bamboo with the help of sharp sand and water, will do exactly the same work, there is scarcely any need of indulging in theoretical "pipe dreams" on the subject of sapphire teeth and steel-like bronze. The same

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THE ALABASTER CAVES OF PISA

Although there are differences in the structure of the caves, the following description may be taken as roughly applicable to all:

Entering a cavernous mouth you descend into a network of galleries which penetrate more or less into the bowels of the earth. In one case the total length of the galleries is only a few yards short of a mile. As you descend you notice that the stratification consists of a huge mass of crystallized limestone rock, sometimes nearly thirty feet deep, and a layer (four feet) of bluish marl; then another mass of limestone and another layer of marl. The alabaster nodules are found imbedded in these masses of limestone in layers of two, three, and (occasionally) four, with a stratum of clayey substance between.

Going to the end of the cavern you will find some men at work with small "T"-shaped picks, by the light of flaming oil lamps of very ancient pattern. They pick away the limestone all around it, until it is ready to be lowered to the floor of the cavern. It is quite common in the best caves to get a block weighing a ton.

In the deeper caves the men work only six hours a day, and never for longer than two hours at a time, owing to the foul air. In other caves which do not go so far down into the earth the hours are longer. The men work by the piece, and receive from 1s. 4d. to 1s. 8d. for the excavation of a block. They get extra for all blocks longer than 2 feet 8 inches, but the average pay is only about 1s. 8d. per day.

The pieces of limestone which are picked out and fall onto the floor are taken away in baskets by boys, who are called "little donkeys." They use both hands to carry the basket, so they cannot hold a light and have to find their way along the galleries in the dark. They earn about sixpence a day.

The estimated annual output of the caves is 3,800 tons, but trade is dull at the present time and there are only about thirty caves working now. The price varies according to size and quality; the best alabaster fetches 15s. per cwt. when the blocks exceed two cwt., but only 5s. 6d. when of less weight. The poorer quality never fetches more than 3s. 6d. per cwt., for blocks of two cwt. and over, and only 1s. 6d. when they are under that weight.—Stonemason.

BUST MAKING.

IN transferring the likeness of the plaster tothe stone, much depends on the accuracy of those who rough-hew the bust—much more on the skill of him who carves, and not a little on the quality of the marble. If the marble is something dull and opaque, close copyism will do, because the materials resemble each other; but if the marble is more transparent, a bolder mode of treatment is demanded—for the lucid beauty of the stone gives something of the effect of carving in crystal—the markings o

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the right and wrong lines of ornament are lost in light, deeper and greater lines and more shadows are necessary. Such must frequently be the difference of the marble from the model; but the difference between the model itself and the living original must be much greater still. In all good busts the eyes are deeper sunk, the hollows on each side of the nostrils deeper and the corners of the mouth more strongly given than in life. Nay, it is well known indeed that the measurements of what would seem most important parts correspond with the flesh and blood. An artist who knows his profession never aggravates any of the determinations of nature; a wide mouth he never widens, a long one he never lengthens; nor does he make a narrow forehead narrower. There are other differences yet. A swarthy face and dark eyes will when covered in marble differ in most material points from the same face if it had a fair complexion and light eyes. To get the full effect of the black eyelash and the dark eye, the sculptor must cut much more deeply into the stone than if he were working for the expression of the other. The contrast between the swarthy glance and the white material calls for deep shadows

A PROCESS OF PREPARING ONYX MARBLE FOR USE IN RELIEF PRINTING

A PROCESS of preparing onyx marble for use in relief printing has been invented by a Salt Lake City gentleman. He takes a piece of onyx marble of any desired size, one surface of which has been made perfectly true and even and thoroughly cleaned, and by the use of a specially prepared ink or stain draws the desired design on the stone with a pen or any suitable brush or transfers any design thereto by any known method. The ink or stain as used by him in drawing the design upon the stone is composed of the following ingredients in the proportions stated, namely, one ounce of asphaltum, three ounces of castile soap, two ounces of lampblack, one half ounce of wax, which has been melted over a slow fire and mixed with them thoroughly and heated to the desired consistency for use with turpentine. After the design is applied to the surface on which the design has been placed to an open flame using a gasoline or any other material that will produce flame with it smoke and continue the application of the flame until the heat has sufficiently softened the ink or stain. Then he covers the surface thoroughly with a preparation composed of equal parts of drying oil and litharge and asphaltum which has been reduced to an impalpable powder of them with a soft brush or other suitable implement, and after the surface has been covered to the depth of from one to two inches with the powder it is allowed to remain for about twenty-four hours, at the end of which time the surface of the design will have become thoroughly cleansed. He then

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again subjects those parts of the surface which are covered with the design to an open flame of the character above described until the tusch, dragon's-blood and asphaltum are slightly fused, and again covers the whole surface in the same manner with dragon's-blood and asphaltum, as before, and again removes the same in another direction and repeats the fusing and covering with dragon's blood four times in all until said surface covered with the design has been so treated with each of the parallel end and side lines upright, and the last time he applies said open flame until the tusch with the dragon's-blood and asphaltum adhering thereto is sufficiently fused to present a dark glossy appearance. The ends and sides of the stone are then painted, except where the design is, carefully with asphaltum-varnish thinned with benzine, so as to flow readily. He then etches the exposed surface containing the design by immersing the same in or applying to the surface thereof the following solution: Pure water, seventy parts; dissolved vegetable gum, five parts; spirits of turpentine, five parts; nitric acid, fifteen parts; sulphuric acid, five parts; and repeats the above process until the design is etched to the desired depth. The ink or tusch and asphaltum varnish is then removed and the surface thoroughly cleansed by the use of alcohol, benzine, or kerosene.

The printing-plates as thus prepared are to have printing-ink applied to them by a roller for printing upon paper in the usual manner. There is no broad novelty in the various compositions used in this process, as most, if not all, of their ingredients have in different proportions and combinations been used before in this art. The specific compositions and steps of treatment in this invention have been found to be the only process that will work with onyx marble by reason of its peculiar chemical and physical properties, and by its use a new and valuable addition is made to the printing art in the utilization of onyx marble for relief-plates.

A NEW BLASTING-POWDER AND PROCESS OF MAKING SAME.

NEW and useful improvements in explosive material and processes for producing the same have recently been patented in this country by inventors from Vienna, Austria.

This material consists, essentially, of a nitrated coal-tar product (carbolic acid being the product which is preferably employed), nitrate of potassium or saltpeter, and sulphur. To this compound is added a substance which will serve as a carrier, such as cellulose in a finely-subdivided state. The blasting power of the compound will be increased if the cellulose be nitrated, and still further increased if to the compound there be added a substance which will readily yield an abundance of free oxygen, such as pyrolusite.

In the manufacture of this improved compound the process is as follows: Into twelve parts of raw carbolic acid (95 per cent.) are stirred ten parts of

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small quarries not yet reported. This production was distributed as follows:

Rough and rubble	$129,035.69
Dimension stone	66,139.80
Crushed for concrete and road use	72,962.95
Lime	117,942.65
Miscellaneous	156,531.74
Unspecified	35,509.20
Total	$577,121.03
Estimated addition	3,600.00
Total	$580,721.03

The stone used for miscellaneous purposes was mainly quarried for rip-rap work on the Mississippi river improvements. The ten chief stone-producing counties, averaged in the order of the value of the output, are given below:

Cedar	$105,652.59
Des Moines	83,179.60
Marshall (single producer)	
Jackson	59,070.00
Scott	47,634.20
Jones	44,291.95
Lee	31,709.85
Madison	14,945.00
Linn	10,045.00
Hardin	9,845.00

The chief lime-burning counties, arranged in order, are Jackson, $58,-550; Cedar, $22,620.15; Dubuque, $10,500. All three furnish a magnesian lime of excellent quality, which is fast obtaining a hold on the Western market. Cedar county has the distinction of possessing the largest single quarry in the state, the Cedar Valley quarry belonging to E. J. C. Bealer. In general, the trade conditions in stone were not greatly different from those of 1896. The small quarries report larger sales and there seems to have been a general, though slight, increase in the amount of stone taken out for building purposes. The lime trade was practically the same as in 1896, and there was no great change in the amount of rock used for concrete and road uses.

COST OF BROKEN STONE ROADS.

THE cost of broken stone for building roads is not so great as many suppose. It can be bought at the crushers for 40 cents per solid yard, and the railroad will freight it forty miles, or less, at about 50 cents per cubic yard, making a total of 90 cents; but suppose we call it $1. Then if the roadbed is nine feet wide and the stone is piled on a foot deep, a cubic yard will cover three feet linear at a cost of $1, making one mile (1,760 yards) cost as many dollars. But as only about nine inches are necessary, one-fourth of this amount, or $440, should be deducted, making the exact amount only $1,320, which is cheap enough for a first-class road, the material for which must be brought forty miles by rail.—Indiana Farmer.

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PRACTICAL STONE-CUTTING IV

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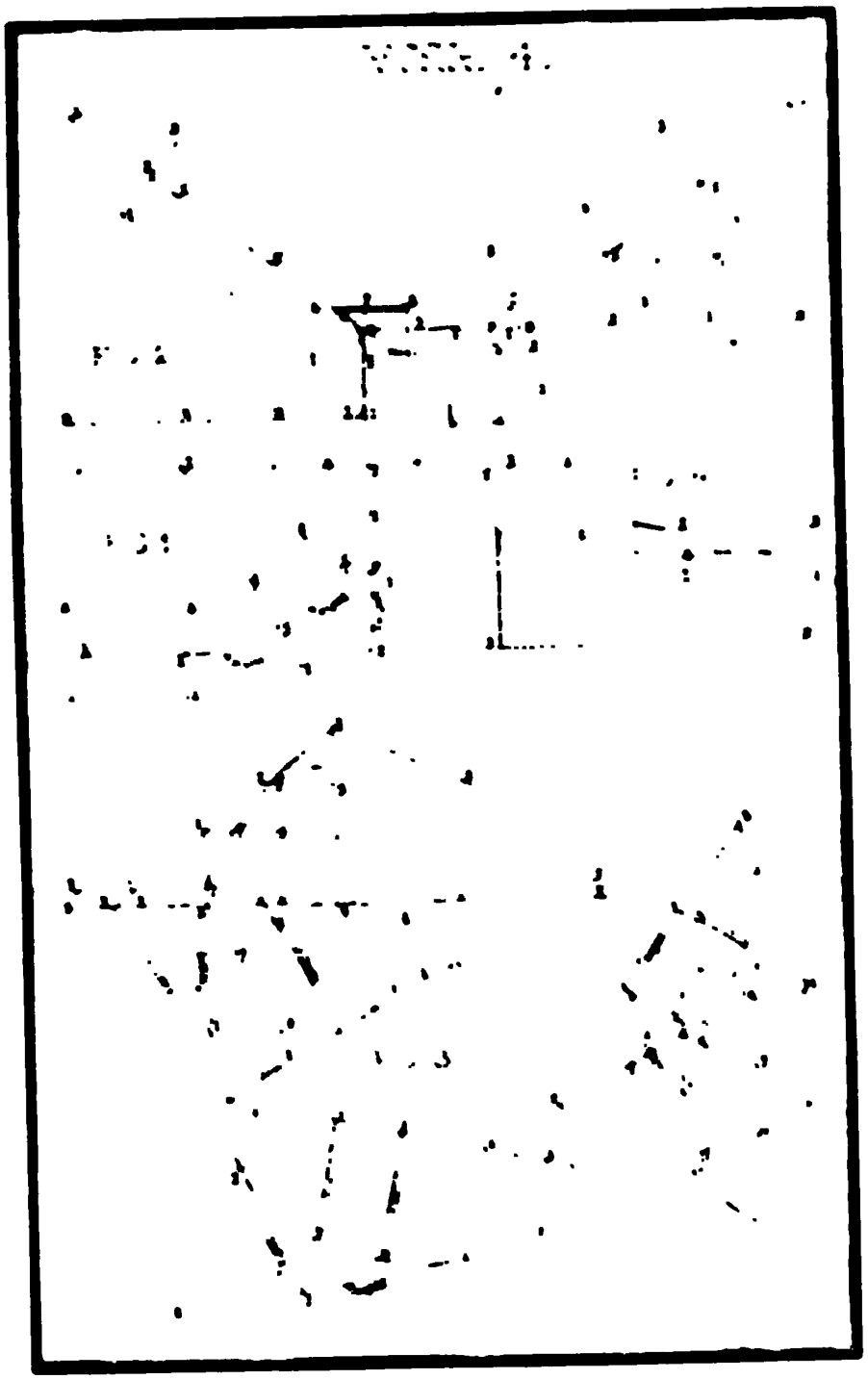
THE INTERSECTIONS OF PRISMS AND THE ENTERMENT OF CENTRE PATTERNS [illegible]



IT was [illegible] to be [illegible] and the prism cut by a plane [illegible] the [illegible] we may easily find [illegible] the prism. The curve has the same relation to the [illegible] as the [illegible] has to the square prism. For a better understanding of the [illegible] are also to make the drawing [illegible] this [illegible] [illegible] A B C D [illegible] A B [illegible] the [illegible] Take [illegible] Then [illegible] Then [illegible] Then

To find the curve: This is simply the finding of a curved line lying on the plane that shall be truly perpendicular over the curve on the plan. The method of finding this is similar to that fully explained for the like operation at Figs. 4 and 5, Plate 2. The drawing being made on cardboard a representation of the solid may be obtained as follows: Produce tangent 3—4 at plan in either direction. Make 3—2′, 4—1 and 1—2″ equal to the length of the sides of the square. Then square up 2′—5, 1—6 and 2″—5″, make these equal to 2′—5 and 4—D. Join 5—A, B—6 and 6—5″. Now take a sharp knife and commencing at point 3 cut clear through the base line to the left of figure to point 2 2′, then around the outline of figure to 4. Then from 4—1, 1—i, i—i′, and at curve i—g—t. Then at the section plane from t—H and H—I. Now at 3—A, 3—4, 4—B and 1—6 above the base line, and at I—1 and I—i′ below, cut about half through the board. This will permit of that portion of the drawing above the base line being turned with the lines on the exterior around 3—4 as on a hinge; then the sides 2′—5—A—3, etc., may be placed exactly over the square of plan. This done fold the lower portion of the drawing, first around the seat line I—1 until it coincides with the angle 1—6 of square. Then the section plane may be folded over into its proper position. The tangents 2—3—t will fall exactly over the tangents of plan; the line I—H over the horizontal trace and the elliptical curve immediately over the curve of plan. In this simple manner a practical illustration of the problem may be had. The beginner may now clearly see the meaning of the terms "vertical planes," "tangent planes," their "traces," and their intersection with the "oblique section plane." For the sides of the square may be taken as representations of vertical planes, of which the lines 1—2—3—4 are their horizontal traces. The sides over 2—3 and 3—4 are called "tangent planes," as their traces are tangent to the curve at the points 2—4; so also are the planes tangent to the curve of the ellipse at the points 2—t: The sides 4—1 and 1—2: The surface I—i—i′, together with the plan ordinates, are termed "auxiliary vertical planes." The line H—I of the plan is called the "directing plan ordinate." It is one of the principal lines made use of at our subject. It determines the position of all level lines both at the plan and section planes. Its position is determined by producing the pitch B—A to meet the ground plane as shown in H. This is one point of its trace; the other is determined by the point I, in which the plane I—i—i′ containing the full inclination of the section plane meets the ground plane. This point (that of the "full inclination") is one to which the student should pay attention. Notice the inclinations 5—A, A—E—B, in which the oblique plane intersects the tangent planes are unequal. These are called the inclination over tangents, while the inclination I—i′ over the plane passing through the center point 1 is termed the "full inclination," and its horizontal trace I—i, the "seat line," is at all times at right angles with the directing ordinate.

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We have gone rather minutely into this problem, for containing as it does the whole of the geometrical principles upon which the development of bed moulds are founded, it is highly essential that the student should thoroughly understand the construction here explained, for upon this depends in a great measure his further progress.

We will now consider the development of the "center falling line." After the stones have been brought to the cylindrical form—that is, the cylindrical faces worked to the direction given by the bed mould—other patterns are required to give the direction at which to form the top and under surfaces of the coping. These are called "face moulds." Two of these are required, one to apply at the concave the other at the convex face. In order to systematically construct them, the pitch or inclination over the center curve of the plan has to be developed. This is called the "developed center falling line." The geometrical method by means of which this line may be ascertained is shown in Figs. 1—2—3. In Fig. 1, O represents the center with which the plan curves may be drawn, A—C—D representing the center curve. We have at this problem assumed the coping to meet at the joint over D: a piece of level coping, and that the twisted in going around the circular wall rises a vertical height equal to that of A—A′, Fig. 3. At the joint over A, Fig. 1, we assume the coping to joint against a piece of inclined straight coping, whose inclination is that given in L—K—D′, of Fig. 2. In order to comply with the above conditions the joint surface over D will be "plumb," while that over A will be inclined at right angles with D—L of Fig. 2. We have already treated upon sections of cylinders intersected with oblique planes. Here, instead of finding the section of the plane, we have to find the development of the curve formed by the intersection of the plane with the surface of the cylinder. To develop the curve: First at the plan divide the center curve into any number of parts, as shown in D—C, etc., of Fig. 2. Then square with A—A′ through D′ draw the base line D—M of Fig. 3; on this set off D—C—B, etc., equal to the length of the arcs of the plan. At each point erect lines at right angles with D—M. Then parallel with D—M from C′, B′, etc., of Fig. 2 produce lines meeting the perpendiculars of Fig. 3 in C′—B′, etc. A curve traced through these points gives the curve of intersection upon the development. This curve is one of the principal lines made use of in Ramp and Twist. As before stated from it are obtained the direction in which to form the face moulds; and perpendiculars to the curve at desired points give the proper inclination of joint surfaces. The method generally employed for finding the perpendicular to the curve is that of bisection, but that does not give a true normal. The geometrical principle by means of which the correct normals may be projected is shown in Figs. 1 and 3. First, to find the position of a line tangent to the

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CEMENT AND LIME.

WHITE PIGEON EXPECTS TO FLY HIGH.

MANUFACTURERS of Portland cement have turned their eyes toward White Pigeon, Mich., and it is possible that ere long the prosperity they have brought to Bronson, Batavia, Union City, Coldwater and other places may be felt in that town, says the White Pigeon (Mich.) Journal. In fact, if rumors be true, the raw material is far ahead of that found in those places, and White Pigeon may soon lead the van in the way of Portland cement. Marl, of which the famous cement is manufactured, is said to be found in unlimited quantities at the bottom of Marl lake and on the shores around it, and especially on the east side. Old settlers tell of a time long ago when a Mr. Snyder made lime out of this stuff which he used to put up stone and brick work in town. If the soil is of this nature, and there is no reason to doubt it, it is far ahead of that found in our neighboring county. Many prophesy that it is only a matter of time before the quiet fields on the shores of this lake will be the center of a big manufacturing industry. This peculiar earth was discovered by accident a short time ago in Branch county, and it was not long before capitalists had options on every piece of property that suggested marl.

NEW YORK'S BIG CEMENT COMPANIES.

THERE are about a dozen big cement companies having their principal offices or selling places in New York City. But this dozen control, practically, the output of the state. Three and a half millions of barrels, both natural and artificial, represent about the product annually of the state. The companies represented in New York have an invested capital of about $3,500,000. One of the large companies turn out nearly a million barrels a year, and there are several with an annual output of from three to five hundred thousand. The export business is not large in this line for several reasons, among them being the high rate of transportation, the freight being so high that the American companies cannot successfully compete with England and France in countries equidistant with them from America. The

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THE CEMENT TRADE IN GERMANY

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AMERICAN PORTLAND CEMENT INDUSTRY

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the field as producers by the aid of cheap machinery and lacking in experience will be the first to suffer. Cheap machinery is poor investment, as the product it delivers will scarcely meet the requirements of engineers and the general consumer who have been educated to demand under guarantees the highest grade of cement only. Strictly modern machinery modeled after that installed in the Lehigh mills has given good commercial results; therefore, new mills coming into being on the same lines will have the advantage of starting right whether the plant be large or small. At the present time there are too many original ideas floating in the brains of inexperienced cement plant projectors which must pass through costly experimental stages to attain perfection. These experiments are costly, and invade and often consume the capital invested in the project without obtaining the end in view. The present outlook will not always be a criterion for the future and the danger of overproduction should be well and fairly considered.—Cement and Engineering News.

ORIGIN AND USES OF CEMENT.

THE consumption of cement all over the world has grown enormously. In 1890 there were in this country sixteen factories, producing 335,500 barrels of Portland cement; in 1897 there were about thirty factories, producing 2,304,000 barrels; while the importations from Germany, England and Belgium for the year were not less than 2,500,000. In the early history of the American industy foreign cements were preferred, but this belief is no longer held, as American cements have demonstrated themselves to be quite as uniform, reliable and strong as any foreign brand.

Most people have a very hazy idea as to the origin of cement, although it was very largely used by the Romans The Roman cement was made by burning pulverized lava and lime and then regrinding to a fine powder. Afterward the method of cement manufacture was rediscovered and maintained as a trade secret. Now, however, there is no secret about the manufacture of cement. There are no patented processes used in its manufacture except upon the machinery by which it is made, and this can be bought in open market. When limestone is burned in a furnace it yields what is known as lime, used in the manufacture of mortar. Cement is a near relative of lime and consists of burning certain kinds of limestone with clay and then regrinding. There are two kinds of cement, known respectively as Rosendale, hydraulic or natural cement, and Portland cement. Rosendale is cheaper and inferior to Portland, both in strength and durability. It is made by burning limestone high in its proportions of clay and magnesia and regrinding to a fine powder. No attempt is made to regulate the exact chemical proportions of the product, the natural rock being merely crushed and burned at a low heat and crushed again. On the other hand, the com-

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city of New York. The lime and cement business has been long established in Newark. It now stands high in the business life of the city, giving employment to some 300 hands. Those engaged in it do kindred work, such as manufacturing calcined plaster, which is done extensively in many grades, and the making of castings for finer work, pottery and molding and for dental purposes. Many grades of lime for building, agricultural and other purposes are made here and marble dust is also produced in considerable quantities.

PROPER MANIPULATION OF TESTS OF CEMENT.

THE committee of the American Society of Civil Engineers appointed to secure the best opinion of experts, and manipulators of tests, in the cement trade have put forth a circular embracing seventy or more questions to which they seek answers from competent persons. This is a most important proceeding in which everybody identified with the cement trade must be clearly interested. We trust, therefore, those of our readers who are interested will communicate with Prof. Geo. T. Swain, of the Massachusetts Institute of Technology, Boston, Mass., requesting a copy of the circular containing the questions, and answer such of them as they are willing to.

Hillsdale, Mich.—A new industry is soon to be established in the vicinity of Cobb lake for the manufacture of Portland cement. This enterprise is in the hands of Jackson capitalists and will employ a large number of men at fair wages. The company's office will be in this village.

Baltimore, Md.—The Maryland Cement Company, organized last year through the efforts of Mr. Frank H. Sloan for the manufacture of Portland cement out of clay, has begun business at Sparrows Point with a force of fifty men.

Jeffersonville, Ind.—Work has been begun on the new cement mill, to be erected on the Peet farm.

Bellaire, O.—Messrs. Charles R. Gostling, of Baltimore, and Ira Momery, of New York, are interested extensively in the manufacture of cement and contemplate starting such an industry here, having had an analysis of some of the clay to be satisfied with the general conditions. Such an industry as they contemplate will employ about a hundred men.

Hastings, Minn.—Rupert Peterson and August Anderson, of Minneapolis, are locating a plant here for the manufacture of cement tile, making the second firm engaged in that line.

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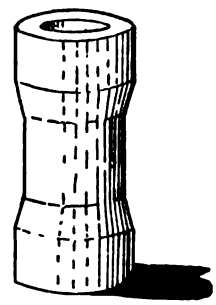
artificially to pressure under the conditions which obtain in the deeper parts of the earth's crust, to produce in them the deformation and catalastic structures exhibited by the folded rocks of the interior of mountain ranges or of the older formations of the earth. They took into consideration the three factors which combined to bring about the conditions to which rocks are subjected in the deeper parts of the earth's crust: (1) Great pressure from every direction; (2) high temperatures; (3) the action of percolating water.



PROF. ADAMS.

In the several experiments which have taken place at McGill, the attempt has been made to reproduce only the first of these conditions. In subsequent experiments the endeavor will be made to reproduce all three of them.

The experiments so far conducted have been made chiefly with pure Carrara marble, and the process followed is thus described in detail by Prof. Adams: Columns of marble, two centimeters and two and one-half in diameter and about four centimeters in length, are very accurately turned and polished. Heavy wrought iron tubes are then made, imitating the plan adopted in the construction of ordnance, by rolling long strips of Swedish iron and welding the strips to the bar as they are rolled around it. When the welding process is completed, the core of soft iron, around which the Swedish iron has been wound, is drilled out, leaving a tube of welded Swedish iron six millimeters thick, and so constructed that the fibers of the iron run round the tube instead of being parallel to its length. The tube is then very accurately fitted on to a column of marble. This is accomplished by giving a very slight taper to both the column and the interior of the tube, and so arranging it that the marble will pass only half way into the tube when cold.



IRON CYLINDER INCLOSING THE MARBLE READY FOR SQUEEZING.

The tube is then expanded by heating so as to allow the marble to pass completely into it, and at the same time leave about three centimeters of the tube free at either end. On allowing the tube to cool, a perfect contact between the iron and marble is obtained, and it is no longer possible to withdraw the latter. Any very slight failure to fit at any point, if such a failure exists in any case, is rendered harmless by the fact that under a comparatively low pressure, the limestone is found to be sufficiently elastic not only to fill up any such minute space, but even to stretch the tube, and, on the pressure being relieved, to contract again to its original form, so that it will drop out of the tube which has been thus enlarged.

When the marble has been firmly placed in position in the tube, an ac-

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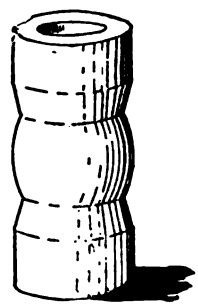
ordinary temperatures, possess a certain degree of plasticity, and can be made to flow, the movements set up developing many structures characteristic of rocks which have been squeezed or folded in the deeper portions of the earth's crust.

It is now the intention of Professors Adams and Nicholson to reproduce more accurately, if possible, the deformation and cataclastic structures of the interior of the earth. For this purpose they have invented an apparatus capable of generating great heat. With this they propose to surround the iron tube, and, by means of steam and heat, obtain those conditions which surround the plastic marble in the bowels of the earth. It has been shown by geologists that marble and other stone formations become plastic in proportion to the depth they are found in mother earth. Thus, marble found five hundred feet below the surface of the ground is much less brittle than that found, say, at a depth of one hundred feet. The reason for these different degrees of plasticity consists in the fact that the former is subjected to far greater heat and moisture than the latter. By means of their new contrivance Professors Adams and Nicholson are confident that they can reproduce the conditions that prevail far beneath the surface of the earth, and they are awaiting with confidence the results of their future experiments.



PROF. NICHOLSON.

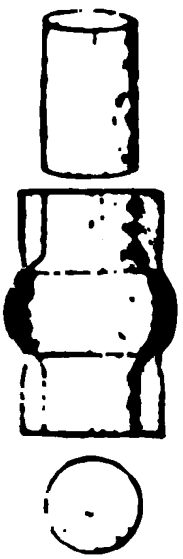
The machinery used in all these experiments was designed and manufactured at McGill, and its counterpart does not exist elsewhere on this continent. It is largely the work of students, who are thus trained in the principles underlying mechanics and hydraulics. The average pressure employed in moulding the marble is 80,000 pounds to the square inch. This is obtained by a number of hydraulic cylinders, which increases the natural pressure of the water mains—130 pounds to the square inch—to the above astounding proportions.



THE CYLINDER AFTER FIRST APPLICATION OF PRESSURE.

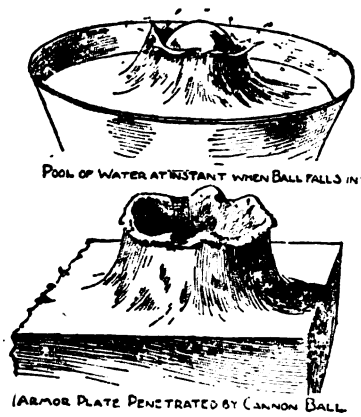
The opinion has been expressed that the experiments suggest a danger from the building of such sky-scrapers as are springing up in our cities. It has been said that if marble, one of the hardest of stones, yields to and becomes plastic under sufficient pressure, then clearly there must be a limit to the height to which one building stone can be heaped upon another in the erection of walls, without incurring the danger of such yielding of the stones of the bottom of the wall or building as will endanger the integrity of a building. For, short of the point at which the stone crumbles, there is

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Numberless explanations have been put forward in elucidation of this puzzle, but the one that has seemed to have greatest plausibility and hence has gained greatest currency assumes that the ice in the depths of the glacier is being constantly melted by the pressure of the mass above it, and is constantly recongealed, being molded into new forms during the moment of transition. The justification for this hypothesis is found in the fact which was demonstrated by Professor James Thomson, the brother of Lord Kelvin, that pressure, if sufficient, greatly lowers the melting point of ice; if cut into and broken into fragments will recongeal into one mass if the parts are kept in contact. It was pointed out by the Scotch geologist and mathematician, Dr. Croll, that the sun's rays, beating upon the surface of the glacier, might penetrate into its transparent depths, and, being retarded at the bottom, might heat the ice at a depth to a temperature above that at the surface and this cause would manifestly act in conjunction with the increased pressure at the bottom of the glacier, to effect the melting of the ice there. At no time, however, would there be any great surplus of heat there and the portions of ice thus melted would be certain to recongeal almost instantly, because of the large quantity of heat which is abstracted and rendered latent whenever ice changes into water. But during the instant of transition from ice to water and back to ice again, the particles of the mass might slightly change their form, under influence of pressure and of gravitation; and thus by an endless series of infinitesimal jerks, as it were, the glacier would creep on as it is observed to do.



Now, however, the experiments regarding the mobility of marble put quite a new complexion upon the question of glacial movement. For if it be proved that marble, a substance far harder than ice, and quite as brittle, can be molded by pressure alone into new shapes, it seems perfectly plausible that a much less degree of pressure might mold ice into new forms by causing its molecules to slide over one another without the intervention of melting. In this view ice and marble, and, of course, all other solids, are to be regarded as merely very stiff or viscid liquids. Gravitation alone does not suffice to make them flow, as it does more limpid liquids, but when additional force is applied their mobility becomes apparent.

This view, indeed, as applied to such solids as iron and other malleable metals is not new, for the mobility of such solids under pressure, as when hammered, is widely known. A curious experiment recently made by Pro-

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TERRE HAUTE TERSENESS.

Bids for the general work on the sewer system were opened on March 1. They ranged from $118,270 to $197,492. It is expected it will take three years to complete the work, since only $40,000 per year is authorized. I may also add that these contracts are for the continuation and completion of a system of main sewers encircling the city termed the belt sewer and which was begun last summer. Nearly $100,000 was spent on this work last season and previous to that in surveys, etc., and when this work is completed it is expected that this city will be well provided with a system of main sewers. There is no stone work on these sewers except catch basin covers which is a small item. The Central Labor Union was on hand with a petition requesting the council to as far as possible see that home labor and materials, such as brick, etc., had the preference, which request was granted.

As for prospects in the building line I have nothing reliable. Two of the architects in the city have some designs on their drawing boards, but as yet will not divulge what they are or who for.

The "Big 4" Railroad Company have options on a number of building lots with a view of buying and building thereon a new passenger depot, and although it is far from being a settled fact at this writing still those in the building line seem to have the idea it will go. It is the only job of any importance that is spoken of. As to what the building may be, material used, etc., I have no idea; but there is no doubt but it will be handsome and in keeping with improvements made by other roads centering here.

Here is a clipping from the *Tribune* which may be of interest:

The indications are that the biggest political sensation of the year will be sprung at the next meeting of the Central Labor union. The *Tribune*, several days ago, announced that the Laborers' Protective Union was in the field against every member of the present council for having permitted outside labor on the belt sewer. Their battle is to be taken up by all the unions of the city. The business men of Terre Haute signed petitions to the council to recognize home labor and insist upon the contractors paying union wages. The papers were ignominously turned down and the result is the present upheaval. The Laborers' Protective Union has announced the platform upon which it will stand and it is expected that the central body will fully concur in this action.

This Central Labor body referred to is at present in a very encouraging and progressive way. In the past few months it has secured a fine hall, bought in a college library, has a reading room established with over seventy journals or newspapers, some of which arrive daily, some weekly some semi-weekly, and some monthly, all of which are donated. This fresh reading matter at hand and a nice clean hall in which to assemble makes it an easy matter to pass the time away. CLELAND.

Terre Haute, Ind.

CLEVELAND CLEWS.

On account of the bad weather very few men are working here at present.

Present indications are that a good summer is before us; so say the architects. They are in the best of spirits with much work on hand.

The following report from the quarries may be of interest to the stone trade in general: The Cleveland Stone Company is running a larger force of men now than ever before at this time of the year. Not only is top earth being removed, but stone is being quarried, dressed and shipped. This is certainly a good indication of returning prosperity.

One of the best jobs in sight at this writing is the Cathedral (Episcopalian). Dean Williams says he hopes to see ground broken in the spring. It will have a front face upon Euclid avenue and its west face upon Perry street, a very beautiful corner. Recently the vestrymen said they would subscribe $85,000 for it.

Cleveland, O. GEORGE.

FORT WORTH WORK.

The stone trade at this point is quite dull, very little being done at the present time, but the prospects are fair.

The Sisters' Hospital is now in course of erection; brick with stone trimmings; of Mineral Wells, Texas, sandstone, a buff colored sandstone and very soft.

There are a few other small jobs going on at the present time. The new union depot will be of brick with stone trimmings. Cannot say how much stone there will be in it. Will probably know by next month.

A small court house was let at New Braunsfel, Comal county, Tex., last week. Price, $36,000, all stone. It will be quarried there as they have a good limestone close to town.

On the 24th ult. a wing to the insane asylum

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plans to be prepared for a new convention hall, to cost about $20,000.

The St. Paul's Evangelical Lutheran School Society are about to erect a two-story frame school building, to cost $4,800. SCALLY.

Peoria, Ill.

ROCHESTER ROCKETS.

At present there is quite a little work both in stone-cutting and masonry on the Erie canal east and west of here.

But very little is being done in the city this winter, although contracts have been let, one local firm securing a contract of $400,000. There were four bridges to be built across the canal this winter, but there is only one under way. The other three will have to lay over until winter because they could not get them finished by the time navigation opens (May 1).

The prospects for the coming season in the building line are anything but encouraging. We may get an armory, provided the Legislature sees fit to make an appropriation.

Rochester, N. Y. MCELROY.

DAYTON DATA.

There is very poor encouragement for new buildings this year, so far as I know. They are talking about a new union depot here, but I understand it is to be of steel and glass.

There will be a new bridge built about eight miles from this city. It will take about 400 perch of stone masonry. The bids for it will be called for on the 26th of this month.

Dayton, O., Feb. 17. D'ONOFRIO.

BEDFORD NOTES.

The Bedford Belt Railway is building an addition to its round house for five more engines. When complete it will be one of the finest round houses in the country, and room for ten engines. They are also putting in a foundation for a supply room, about 40x25 feet, all of cut stone.

The Bedford Quarries Company are putting up a new sawmill at Limestone. The boiler room and planer room are built of cut stone, 18-inch wall.

The Perry, Matthews & Buskirk Stone Company succeed the old firm of Perry, Matthews & Buskirk Company. Mr. Wm. N. Matthews remains as vice president and general manager. The new company took charge on February 1. New company starts out with excellent prospects of increasing the already tremendous business of the famous quarries. Mr. Matthews recently returned from New York City, with an order for the stone that will go into the new Art Museum building. It will require over 400 carloads of their best buff stone. This will keep the force at the quarry "humping" for some time.

All the quarries are running, but not with a full force. EDGAR.

Bedford, Ind.

PARKERSBURG PARTICLES.

There has been no change in building this month to amount to much, the only thing I know of being a new building for the Parkersburg National Bank and a warehouse for Bentley & Gerwig, but the plans are still in the architect's hands.

There was a block let in Sistersville, W. Va., last week to Mr. Rea, for $13,000; brick and stone. O'Neil, of Marietta, architect.

The contract for the electric street railway here was let to Hallock, of Wheeling, W. Va., for $96,000.

There are at least one hundred houses under contract here now and wages have increased accordingly. The contractors have formed an exchange here for the better protection of their intereets.

There are eight architects in competition for the Citizens' Bank here, but the contest is not decided yet. The estimated cost is $60,000. The first story will be of stone and remaining four stories heavily trimmed. Will let you know who gets it in next letter. STOYLE.

Parkersburg, W. Va.

KANSAS CITY CONCERNS.

The prospects for building are bright for next summer. The architects are busy preparing plans, especially for residences.

Excavation was in progress all winter on Fourth street and Baltimore avenue (the Corrigan estate) for a big building half a block each way. James Brannon is the architect, but the nature of the building has not been definitely settled yet.

The architects of the city are preparing plans in competition for a convention hall building, to cost $100,000. Stone used in construction will be from this state. The successful plans will be selected on March 1.

One hundred and ninety-two thousand and eighty lineal feet of curbing were set in this

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BRICK AND GRANITE BLOCK PAVING

To the Editor of STONE:

Inclosed find $2.00 Postal Money Order for continuance of my subscription to STONE for another year (1898). Of course you cannot publish a magazine in which everything pleases everybody, but after several years' subscription, I can safely say *every* number has *something* of special interest to me.

Allow me to call your attention to a matter of vital interest to granite men. The vitrified brick men are pouring out money like water to supplant the use of Belgian blocks with brick in street paving. Can you not collect data wherein both have been tried to the great advantage of the Belgian blocks? Brick may be all right on residence streets of light traffic, but surely under heavy traffic and grades of more than 2 per cent. or 3 per cent, or in climates which have frosts to make slippery surfaces, they must be much less desirable, if the life of each were the same. Surely the wear of the Belgian blocks must be so much longer that the average yearly cost for maintenance would favor the Belgian. The foothold for horses must be superior on the rougher surface of the blocks and I have seen it somewhere advocated as preferable that horses should not travel over so dead smooth a surface as asphalt or its near approach—brick. Again, contractors for street plumbing, I am told, say the brick paving can never be put in proper shape again after having once been broken to repair defects in piping laid in the streets.

Can you not institute a search among granite men and street contractors and city engineers who have tried both pavements extensively on level and hilly streets, light traffic and heavy traffic, and give us an early paper on the subject that shall help us with facts and figures? I am sure such a paper would be warmly received among the stone men who want to know how to make use of their "leftovers" in quarrying dimension stone. Very truly yours,

A. B. COOK.

The contention over which is the best material for roadways has been going on for years and is no nearer a final decision than when it began, and never will be. The point is conceded by everybody, we believe, that no pavement material up to date is superior to the granite block for enduring quality; none are superior to asphalt on concrete for easy traction; none equals properly made macadam for general purposes and low cost to keep in order. Which is the best under specific conditions is something only those interested are competent to decide.

STONE would be glad to receive contributions or correspondence bearing on the relative merits of the different materials used in making roadways, as shown in the experience of those who have given the subject study.

QUIET AT SAULT STE MARIE.

There is nothing doing here yet. They are working on that yard gate night and day to get it finished for navigation and there is talk of the water power going ahead this spring. They are fixing up two buildings for offices.

I shall know more next month about what is going to go on the coming summer. Our outdoor work doesn't begin until about the 15th of May. MILLER.

Sault Ste Marie, Mich.

LITTLE DOING AT LEYDEN.

As far as I can learn prospects are good in this locality for the coming summer.

W. D. Dodge, contractor here in the Sugar River quarries, has considerable coping to get out yet for the Owego Canal job that they were working on all last summer.

There is going to be two locks let here on the Black River Canal sometime in July. That will give them all they can handle.

There was a State Normal School building let in Rome, N. Y., last week to Cramer & Co., of Rome. Consideration, $38,000; pressed brick, with stone trimmings. DYGERT.

Leyden, N. Y.

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OUR FOREIGN TRADE IN STONES, ETC



RETURNS IN BLACKENING CASE

aside by Judge Clifford. The claim upon which it is sought to recover damages is that the railway companies, before the end of the A. R. U. strike of 1894, agreed between themselves that they would not employ any man who had been engaged in that strike, and that each advised all the others of the names of the men who had gone out during that strike and refused to return to work.

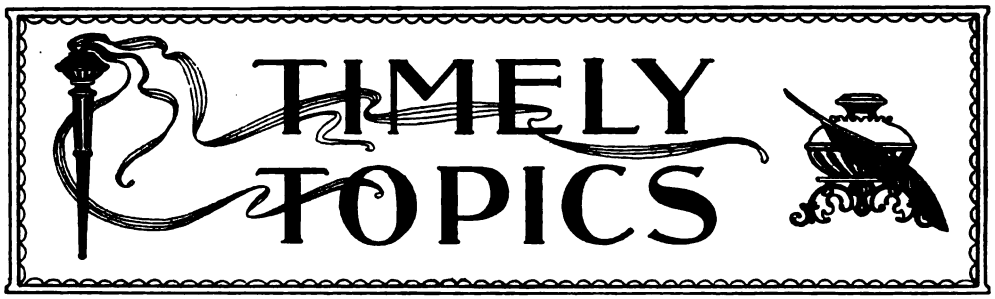
It is urged that an agreement of this sort was not illegal and that it was as permissible for the railroads to make an agreement of this sort as it was for the men to agree that they would not work for the railways. It was conceded, upon the argument, that no misrepresentation was made by one company to the other, and that no railway company could be compelled to employ any man applying for a situation. The court was of the opinion, in deciding the motion, that this statement contained no charge of any unlawful action on the part of the railways, adverted to the fact that a claim of the sort thus presented might as well be made against any other employers of labor and against the employes themselves when entering into a voluntary agreement for their own protection; and, influenced by these considerations, sustained the demurrer to the declaration and entered a final judgment for the defendants.

JUDGMENTS AGAINST BERLIN & MONTELLO GRANITE COMPANY STAND.

AN important decision was rendered by Judge Burnell at Oshkosh, Wis., in the matter of the receivership of the Berlin & Montello Granite Company. The validity of the receivership was not passed upon. The court ordered the sale of the real estate in Green Lake and Marquette counties, and gave the intervening creditors the relief asked in that it recognized and upheld their judgment and judgment liens held against the property of the defunct company. The creditors who gain by this decision, and whose attachments and judgments must be satisfied out of the proceeds of the sale of the Marquette and Green Lake county real estate, the title to which, the court holds, never passed to Receiver Calvin B. Beach, are as follows: Andrew Shikirkie and Fred Heller, holders of attachments taken before the appointment of a receiver; George Kilbride and A. G. Becker & Co., holders of judgments recently taken. These creditors were represented by Fowler and McNamara, of Montello and Portage. A brief statement of the above case is as follows: In March, 1897, the Hibernian Banking Association, of Chicago, obtained a judgment against the Berlin & Montello Granite Company, an Illinois corporation operating quarries in Wisconsin, at Montello and Berlin, and procured from the Circuit Court of Cook county an appointment of a receiver. On the same day a receiver was appointed by the court here on the application of the plaintiff, setting forth, among other things,

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MUST GIVE WARNING OF BLASTS



Disfiguring Ornament. The use of ornament in buildings follows very much the same lines as commercial methods in different sections, or, as we might more tritely indicate our point, as people's manners are in different sections of the country. It is said the bright man of "no country" can tell at a glance where the one he meets on a railway train hails from. In other words, the manners of a man indicate the sort of environment in which he was brought up, and that environment is clearly defined by geographical lines. Thus the New Englander, for instance, he says, personifies colonianism in everything he does; the Southerner oligarchism modified by an hundred years' experience with democracy; the Westerner an empiricism that accepts nothing that is not original and follows only that which has been evolved from his own practical experience in civilization. If we can accept such reasoning then we may discover the starting point for the distinctive characteristics shown in buildings whereon ornament is, or is not, the conspicuous feature.

Who has not seen buildings of high cost made to look cheap because overloaded with ornament? And per contra, those of low cost made to appear high-priced by the judicious use of ornament. Some of these incongruous buildings seem as if they had been designed as adjuncts for the display of circus posters; and others are in truth veritable billboards. Richness of material, its tasteful grouping with reference to the utility of the building, will always make it surpass in appearance any whereon ornament has been misused, however costly the use of it has been. This is true, beyond a doubt, in the case of stone buildings. Terra cotta construction is an exception. There's nothing rich looking in baked clay in whatever way it is prepared, yet a brick building without ornament is simply grotesque.

Weight, solidity, endurance, expressed with good materials, if combined with good judgment, is always pleasing. The logical use of ornament is to break what otherwise would be monotony, but what is drearier than monotony of ornament? We deplore the tendency of modern builders to be excessive in the use of it. There is nothing tasteful nor pretty about the lavish use of it in buildings that are designed for substantial purposes.

Increase in Quarries. One who has kept tab on the number of items in STONE for six months past relating to the opening up, or proposed development, of new stone deposits in all principal sections of the country, and in newly discovered sections, also, is likely to express apprehension that the business will go from bad to worse, if he has failed to look on the other side and taken note of the great progress making in nearly every direction in which stone is employed. The use of wood entirely in a

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Tasty Advertising

Lithographic Stone.

"Heathcoat" Movements

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an explanation of his views on the subject, to which he responded as follows:

BISHOPSTEAD, WILMINGTON, DELAWARE, FEB. 26, 1898.

My Dear Sirs: Thanks for your letter and for the accompanying copies of STONE. My views on the subject to which you allude are simply these:

Memorials of our departed relatives and friends who have died in the Lord, should be expressive of their faith and of ours in a living Christ and in a blessed immortality. This would exclude all such heathenish monuments as are, alas! so commonly found in our cemeteries, and which tell only of blasted hopes and annihilation; such, for example, as obelisks, urns, shattered columns, faded flowers, storm-wrecked vessels, etc. If these do not convey, of necessity, such symbolism, they at least convey no idea whatever of that faith and hope and patience which are expressed in Christian symbols.

Secondly, such memorials should be simple and inexpensive; the money so often lavished upon them being more wisely devoted to some useful object which can carry on the good works of those so commemorated.

One word more as to the heathenish monuments. So far as they are concerned, and in their multiplicity, one might as well be walking in some burial-place in China, or Japan, or Africa. What is there, so far as they are concerned again, to remind one of a *Christian* country? I remain, faithfully yours,

LEIGHTON COLEMAN.

If we may be pardoned comment of the reverend gentleman's settled ideas of what is "heathenish" in memorial architecture we should say, in respect of his conclusions, that, from the standpoint of a churchman, he is quite right. One of the types of monuments referred to as "heathenish" is only so in a Christian sense, and solely that it is a reproduction of a design first erected by so-called heathens. We refer to the obelisk. As to the others they are certainly heathenish in several respects, and for the sound reason the reverend gentleman states, that they "tell of blasted hopes and annihilation," and for the added reason that they are inartistic. In what respect has character in man resembled a draped urn, a shattered column, a faded flower, or a shipwrecked vessel? The living do not care to be reminded of what was pitiable in the life of the departed. They don't erect memorials to perpetuate their own sorrows. We do not think the stately obelisk can be justly classed beside the designs mentioned by Bishop Coleman as heathenish. Though of pagan origin, still it is one of the most majestic types of monumental architecture that the world has so far produced. Who can look upon the Washington monument and not be thrilled by its surpassing beauty and its imposing grandeur? What lessons of strength, of simplicity, of majesty, and of lofty inspiration it teaches? No, the obelisk is not "heathenish," though of the heathen born. Put it beside the "angels," the "open bibles," the "fingers pointing upward," the "wounded hearts," the "recumbent lambs," "the crowns and crosses," the "crucifixes" and like symbols that are graven and set up to impress the beholder that the dead so memorialized had but the single purpose in living to prepare themselves for a future life they were given to know no more about than the idolatrous heathen who "bows down to wood and stone," and what is more heathenish than they appear to be to the enlightened sense of this progressive age?

We commend most heartily the courage and the intelligence of Bishop Coleman in giving utterance against the desecration of our cemeteries with so many types of monuments that convey no idea whatever of what they are designed to commemorate, but are simply tangible evidence of a sort of spiritual insanity that gives itself expression in grotesque forms.

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SELECTED MISCELLANY.

ANCIENT CORALLINE LIMESTONE

A [illegible] geological excursion by Professor Dana of the University of [illegible] to the northern portion of the Santa [illegible] an interesting region for [illegible] the structure of the mountains. A [illegible] mountains covered with snow was [illegible] and formed the base of a structure [illegible] the mountains. It was a very fine [illegible] It also was that at some time the [illegible] mass washed the base of the Santa Cata[illegible] Range, [illegible] grew there and [illegible] left [illegible] structures upon the beach. The [illegible] was a coral of human [illegible] but above [illegible] [illegible] and several different species are found there, some a few above. These fossils are particularly [illegible] the geological age of the [illegible] limestone mountains. The [illegible] reefs are [illegible] and [illegible] and these in turn rest upon trap and granite. The mountains descended to the sea and covered again a portion of the granite. It gives a horizon; and [illegible] from reference. It shows the [illegible] of the coal [illegible] and the [illegible] a part of Arizona where they have not been covered before. There is a great [illegible] of coal [illegible] of the [illegible] carboniferous rocks [illegible] trap rock and [illegible] granite.

INDIAN LEGEND TOLD IN STONE

During the month of August Mr. Putnam [illegible] a strange monument which [illegible] on a portage on the Ogeechee [illegible] from the [illegible] to the Savannah River. From [illegible] a branch of the Central [illegible] Railroad [illegible] a mile and a half [illegible] the [illegible] to the [illegible] of the Ogeechee [illegible] the [illegible] of the [illegible] [illegible] [illegible]

age, seize him in its enormous claws, and bear him away. Some of the bravest warriors and hunters were carried off and the great eagle became a reigning terror.

"On the top of a tall mountain the eagle made its home, and the mountain is supposed to be Stone Mountain, near Atlanta. Expeditions were formed to kill the eagle, but this was not accomplished until a tall, handsome, powerful young Indian, named Maneeco, had his young wife, Eulahaha, taken away by the monster bird, when he followed it to its mountain home and sent an arrow through its heart.

"Maneeco loved his wife dearly, and one day as he returned from a hunt with a deer thrown across his shoulder, he halloed to Eulahaha on entering the village, and she all glowing with pride at her husband's success, ran out to meet him. When only a short distance from the wigwam there was a great, rushing sound, like the roaring of a mighty wind, and the eagle darted down upon her, and, seizing her with his great talons, bore her away.

"As if turned to stone, the Indian stood for a moment; then, recovering himself, he threw the deer from his shoulder and dashed into the wigwam. Collecting a full quiver of his best arrows and snatching up his war bow, he rushed out into the forest, taking the direction of the flight of the bird. The other Indians said they would never see Maneeco again, and they moved about the village, terror and despondency depicted on every face.

"Just as the sun was rising on the fourth day of the appearance of the eagle and Maneeco's departure, the natives were startled by a loud warwhoop on the outskirts of the village. On gathering there a strange sight met their gaze.

"An Indian warrior stood facing them, but in such a pitiable plight that at first he was not recognized as Maneeco. Great masses of flesh had been stripped from all parts of his body, his face and neck were scarred with many long and ugly gashes, while the ball of his left eye had been completely torn from its socket.

"At his feet, with his right foot resting upon its body, lay the great eagle, rigid in death. The poor fellow was almost dead, and only lived long enough to tell his people how he had followed and slain the eagle, and asked them to go to the mountain, find the bones of the hapless Eulahaha and bury them with him, so that they could journey through the spirit land together.

"Thousands of Indians gathered when the news spread, and the lifeless body of Maneeco was bedecked in all the habiliments of a chieftain and stretched out in the center of the village, with the great eagle at his feet. The summit of the great rock mountain was scoured by a score of Indians, and the bones of the hapless Eulahaha were found and taken back to the village and buried in the same grave with Maneeco.

"A council of all the tribes was held, and the Indians agreed to build the monument—a perfect resemblance of a huge bird stretched out upon its back."

CHINA STONE.

THIS material, from the circumstance that it is raised very largely in this country, in Cornwall, often goes by the name of "Cornwall stone," and there are many other local names applied to it. The passage of true china stone or carclarzite into china clay is very gradual, but where the one begins and the other ends is easily defined, and the china stone is, in fact, largely utilized at the present day in the manufacture of the china clay.

To confine our attention to the stone, itself. On looking at it in the quarry, one feels instinctively that it is granite one is looking at. After coming out of granite quarries in the neighborhood our eyes are accustomed to seeing larger porphyritic crystals of orthoclase feldspar with little dark mica and schorl patches. There is a comparative absence of schorl in this carclazite, but we seem to see the whole, only in skeleton. The minerals have been "washed out," so to speak. The orthoclase is brave enough until you scratch it with a knife point, and you find its hard crystalline nature has turned into clay.

The chief value of carclazite is in this decomposed feldspar. The rotten, decomposed granite is easily broken down, and is, in fact, the material out of which the bulk of the china clay now used is made. As china stone it may be sent away in the rough. When ground and finely sifted and prepared (and there are many grades), the material is extensively employed for brick glazing; while it is also much in demand for many purposes by the potter. Car-

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steel skeleton in its general engineering principles. Posts are set in the ground and the skeleton framework is all notched and lashed together. The exterior is simply a covering to keep out the weather. The steel skeleton is much like a bird cage, firmly riveted together at every joint, so that the shaking of an earthquake might shake off some of the exterior masonry, but could not injure the building nor its inhabitants.

In building in an earthquake country, special precautions should be taken whereby any injury, either external or internal, could be entirely avoided, and one of these tall buildings would be as safe as the middle of a ten-acre lot. The extra earthquake precautions are neither difficult nor expensive, They consist in putting in additional ribs in the partitions and external walls to which the masonry is firmly anchored. In such a building all the partitions should be of concrete, with steel rods imbedded in it.—W. L. B. Jenney, in Cassier's for March.

LIGHTNING.

WHEN, by the progressive condensation of the clouds, the electricity—which always closely invests all floating particles of water or other substance—becomes sufficiently intensified, a giant spark is, as it were, crowded out, and sets off toward the earth, which, locally, at that moment, is negatively electrified. If of great intensity and volume—shown by its brilliancy and whiteness—it makes an almost direct path through all obstacles to a point in the earth, perhaps almost beneath its starting point. If the discharge be less in quantity and intensity—indicated by its bluish color—the long spark is frequently turned aside from its course, and we behold a crinkled hue, often running a long distance but little inclined from the horizontal. This is what is called "chain-lightning." When the spark is small but intense, showing reddish-white color, it makes its way in a direct rush, until the obstacle before it becomes too great, when it turns sharply and rushes straight on in another direction until the resistance increases sufficiently to again turn its course; it then rushes away nearly in the direction it first took, until forced to make another sharp angle. This action continues until it reaches the earth. This kind is properly described as zigzag lightning.

When we have seen the flash, and even more when we have heard the thunder, we need no longer be afraid, for the danger is past. The terrible voice from the sky—the reverberation from the rending of a path through the atmosphere by the fiery spark—bears only a message of mercy, announcing with authority that now each trembling child is safe.—George J. Varney, in March Lippincott's.

A QUEER DOME.

THERE are few places in the world where one may stand and count, within range of the naked eye, thirteen domes, among which is one of considerable dimensions; yet this can be done on the island of Malta. Standing on a hill above Silema, a short distance from Valetta, thirteen domes are within sight, and that of Mosta is one of them, towering high up above its neighbors. Mosta is a squalid village, situated about four miles from the city of Valetta, but at one time it was a town of considerable importance.

In the early part of the present century the villagers and cure, finding the old church too small to accommodate the increasing population, determined to enlarge the church or build another. The village mason was consulted, and after several confabs over the matter, it was decided to build a new church altogether, and that it must be built on the site of the old one; and it was also decided that the old church should not be removed until the new one was ready to occupy. Here was a dilemma. The whole matter, however, was left in the hands of the priest and the mason. These two men set about the work, built the new church over the old one, and as soon as it was ready the old church was carted away so rapidly that not even a single Sunday service was omitted. The great dome was built without the aid of scaffolding within, yet it is one of the largest in the world and is considered among the finest. The mason who erected this structure applied many original and novel devices that are not permissible in general building practice, yet time has proved that his methods were

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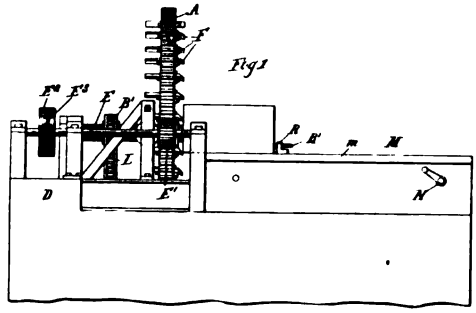
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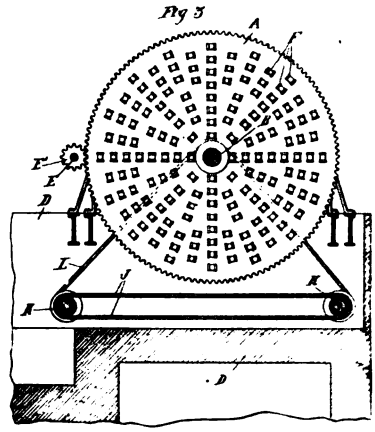
RECENT PATENTS.

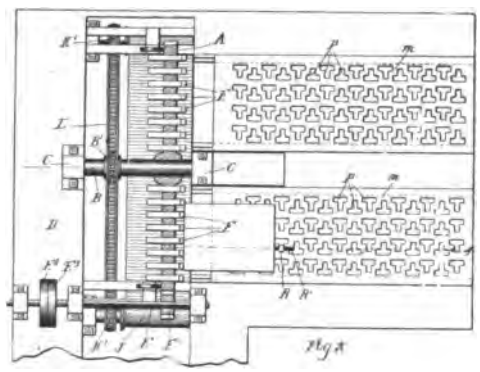
STONE-JOINTER.

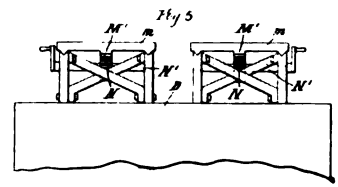
Patent No. 587,588, issued August 3, 1897, to August Larson, of Chicago, Ill. Application filed August 24, 1896.

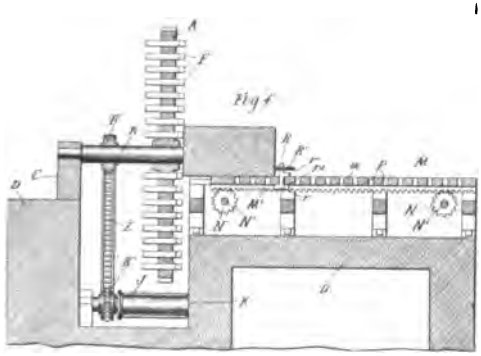
The objects of this invention are the production of a machine capable of easily cutting or planing the edges or sides of blocks of stone, the allowance of such cutting at right angles to another of the sides of the block, the provision of means by which the stock may be securely held in place during the cutting process, and of means by which the stock may be fed forward, the ready disposition of the refuse resulting from the cutting, and the attainment of such results with economy and efficiency. In a machine characterized by this invention a number of cutting-tools are supported by a movable carrier, and the carrier is arranged to be moved so as to bring the tools successively before the stock to be cut or planed. A bed or table is provided, upon which the stock may be ar-

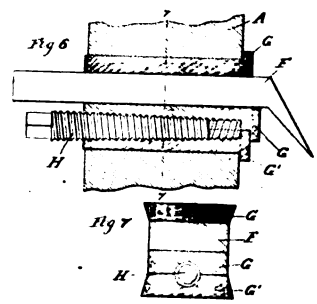












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pressing the tool against its work the valve is opened and the tool operated. Should the tool slip from its work, the valve is immediately closed and no injury can be done to the hands of the operator.

In the drawings, Figure 1 is an elevation, partly in section, showing the invention applied to the Boyer pneumatic hammer. Fig. 2 is a plan of Fig. 1.

A socket A, attached to the holder end of the hammer B, will be observed. In this socket is

FIG. 1.

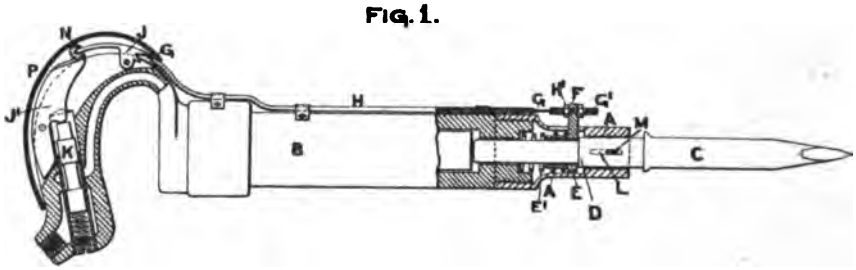
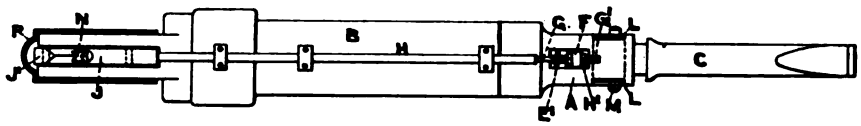


FIG. 2.



placed the tool C, which is made with an extra shoulder D to bear against a spring ferrule or socket E, upon which is a finger or projection F, connected to a push-rod G, which passes along a sheath or cover H to the pivoted lever J and trigger J′, which is connected with the valve K of the hammer.

In the attachable socket A is formed a series of holes or slots L, for a pin or cotter M, with a pin or cotter hole in the tool C to secure it in position and prevent it turning round or slipping out and to keep it taut against the spring E′. This arrangement is equally applicable to hexagon and to round tools. For easy working on the end of the lever J, bearing upon the trigger J′, is attached a grooved runner or disk N. P is the cap or cover. When constructing new hammers the push-rod may work in a groove or slot in the hammer. It will be seen that by simply pressing the tool C against its work the push-rod G is moved, which depresses the runner N and trigger J′, opening the valve, and thus putting the tool in operation. The moment the tool is out of contact with its work the spring draws back the push-rod and the valve is closed, and it stops work. By regulating the pressure of the tool against its work the lightness of the blow or stroke is regulated. The push G can also be regulated as to its contact with the lever J by means of screwed end G′ and nuts H′.

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Stone-Working Machinery For Sale

FOR SALE.

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STREET IMPROVEMENTS

CURBING

The Meramec Highlands Quarries

SPIRAL



Sand Pump

SAWING STONE.

FRENCH & LeBEL MFG. Bethel, Vt.

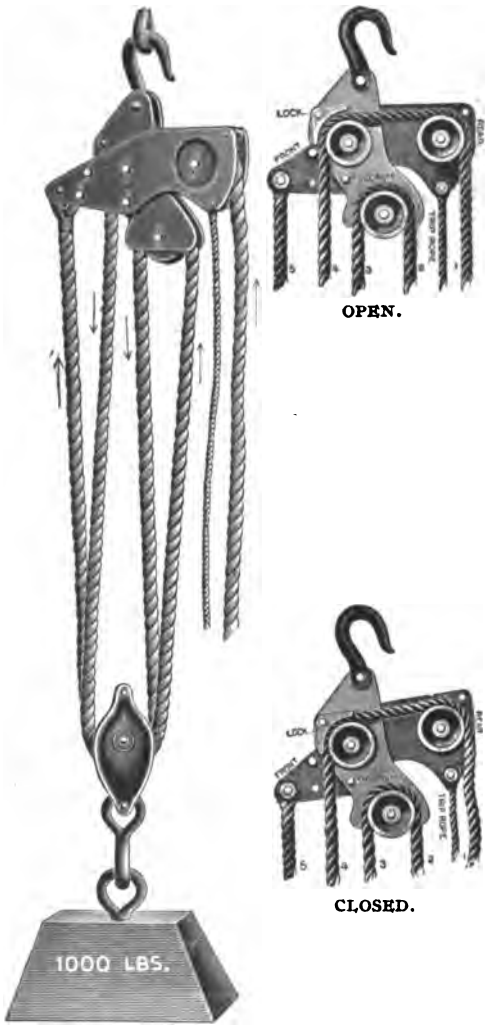
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MACHINERY AND SUPPLIES.

[Matter appearing under this head is compiled and edited from data furnished by the advertiser, and should not be accepted as the opinion of the publishers.]

BURR'S AUTOMATIC SAFETY LIFT.

We illustrate in the accompanying engravings Burr's automatic safety lift, of which The Burr Manufacturing Company, 813 Society for Savings Building, Cleveland, O., are owners and makers.



BURR'S AUTOMATIC SAFETY LIFT.

This improved self-locking tackle block possesses so many points of superiority that it practically belongsin a class of its own. In the first place, it is absolutely automatic and adjustable, Its action being positive and certain, it locks securely in any position—hanging straight, upside down, lying flat, or at an angle—and regardless of whether there is a wet and greasy rope or not. The heavier the load, the more secure the hold.

It sustains the load at any point without fastening the rope, and is never hard to unlock.

The Burr safety lift is made of the best selected steel. No part of it can be worn out by ordinary usage, and it is claimed to be far cheaper than the ordinary lock blocks, as it has no wedge, eccentric, springs or teeth to get out of order and need constant repairs. The brake against which the rope is locked being perfectly smooth can in no way injure the rope. Use makes it work more perfectly, whereas, in the ordinary rope block heretofore made the brake or lock consists of a wedge or eccentric that must be rough enough to bite into the rope to lock at all; when worn smooth these wedges and eccentrics will not hold the rope; when rough they soon wear it out.

These lifts are especially suited to the requirements of builders, masons, quarries, and all places where material is to be raised, lowered or moved. To the quarryman or stone dealer they are more or less of a boon. With this labor-saving device one can do the same work that, without it, would require two or more extra hands. It will be found specially useful in setting monuments, heavy bases, footings, etc.

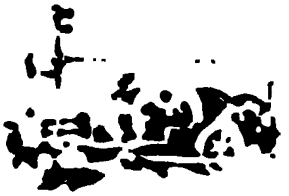
CHANGE IN PRICES.

Attention is called to the corrected quotations in our Prices Current of the Pittsburgh Crushed Steel Co. A material reduction has been made in the prices of the various grades of crushed steel for use in stone-working, making its use more essential than ever in every well ordered mill.

IT'S "A NICE TRICK"

To cut a circle in a block of stone on a planer. Every stone-mill operator knows what a costly job it is to get true circles by hand work, and how often failure results in the effort to make a planer, not rigged to do it, perform the service. The F. R. Patch Mfg. Co., of Rutland, Vt., with branches in Chicago and Baltimore, claim that they have the only planer in the

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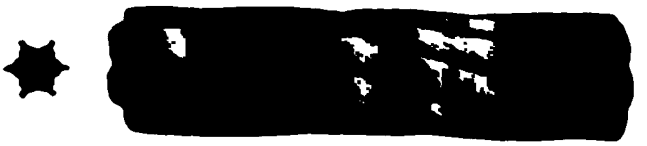
THOMAS CARLIN'S SONS.

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Manufacturers Hoisting Engines, Derricks of Steel or Wood, Contractors' Tools and Machinery.

THE HAZARD MANUFACTURING CO.

"Hazard" Iron, Steel and Galvanized Wire Rope.



Long Lay and Regular Lay Construction

"HAZARD" PLOUGH STEEL ROPE A SPECIALTY.



McKIERNAN DRILL CO.

120 Liberty Street, New York.

Rock Drills

Air Compressors

Quarrying Machinery.



THE DUBB PATENT

Steel Safety Lift Block

THE DUBB MFG. CO.

Hawley's Patent Sand Feed

E. J. & C. M. HAWLEY,

Manchester, Vt.

FRONTIER IRON WORKS DETROIT, MICH.

HIGH & IMPROVED

GAS ENGINES



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world that will cut true circles, and they are ready to verify the statement. They are up-to-date engineers and machinists, and can be relied on to make every claim good that they make for their types of stone-working machinery. They ask you to write them and they will tell you all about this remarkable machine.

LITIGATION OVER GYRATORY CRUSHERS.

The attorneys for Fraser & Chalmers, appellants in the litigation with Gates Iron Works over claim for infringement of features of the gyratory crusher, report to their clients as follows:

CHICAGO, March 4, 1898.

Messrs. Fraser & Chalmers, City—GENTLEMEN: The United States Circuit Court of Appeals yesterday filed an opinion in the case of Fraser & Chalmers, appellants, against the Gates Iron Works, reversing the decision of the court below on the first claim of the Gates Patent No. 259,681, and remanding the case with order that the bill be dismissed for want of equity. This claim, you will remember, was for the tapered journal and bearing. As this was the only claim of the several patents in suit, which was sustained by the court below, the decision of the Court of Appeals settles conclusively in your favor the last remaining vestige of any claims for infringement by you of any of these Gates Rock Crusher patents. Judge Woods, who writes the opinion of the court in a long and carefully considered opinion, holds that the claim in question is void for want of patentable novelty. Yours truly,

BOND, ADAMS, PICKARD & JACKSON.

As this litigation is of more or less interest to many in the crushed stone trade, we present an illustratioon of the Fraser & Chalmers crusher. The Gates type of crusher is familiar to everybody. Also follows statement from the Gates Iron Works:

CHICAGO, March 9, 1898.

Referring to the case just decided in the United States Circuit Court of Appeals and referred to in the statement made by Fraser & Chalmers' attorneys, we desire to say that this was an appealed case from the Circuit Court of the United States for the Northern District of Illinois.

In the original suit, the Gates Iron Works sued Fraser & Chalmers for the infringement of United States Letters Patent No. 259,681, granted June 20, 1882, to Philetus W. Gates. This patent related to one of the journal bearings of the Gates gyratory breaker. The case was argued before Judge Showalter, who, in a long and carefully considered opinion in which he treated exhaustively the principle involved, decreed in favor of the complainant, the Gates Iron Works. An appeal was taken, as before stated, to the United States Circuit Court of Appeals, which court, through Judge Woods reversed the decree of the lower court.

This same patent has been adjudicated upon no less than four times, the decisions having been twice in favor of sustaining the patent and twice against it. Learned counsel and learned judges have wrestled with this mechanical question for ten years or more. The results only show the uncertainty of any question relating to patents. We ask of the public to bear in mind that the patent involved in this suit is only one of many patents relating to gyratory crushers owned by the Gates Iron Works, and that the said patent had nearly expired by limitation. It has been sought to make it appear that the Gates Iron Works had infringed the patents of our competitors. The litigation concerning this patent was all originated by the Gates Iron Works in defense of their rights. Having perfected the gyratory crusher and brought it into almost universal



use in all parts of the world to the extent that there are now nearly 5,000 of our crushers in successful operation, our success along that line has been still more emphatically demonstrated by the attacks made from time to time upon our patents.

It is an old and trite saying that a United States patent is simply a certificate of admission to the Supreme Court, with the chances largely in favor of adverse decisions. In this case the patent, though covering a valuable principle, is an immaterial feature among the many Gates Iron Works' inventions and patents.

GATES IRON WORKS.
H. W. HOYT, Secy.

GRANITE AND MARBLE IN ONE QUARRY.

The marble quarry at Avondale, Pa., is a marvel to many, with its light gray granite on top and its milk white marble below. At present many men are at work getting out the stone for the court house at Paterson, N. J., granite for the lower parts of the building and

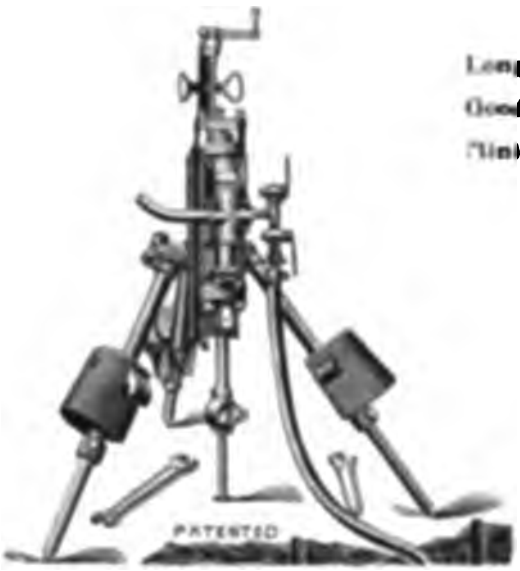
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THE "BADGER" DRILL.

Unexcelled Blow.
Interchangeability.
Few Parts.

Long or Short Stroke.
Good Lifting Power.
Minimum Repairs.







Simple.
Efficient
Economical

Light.
Strong.
Durable.

THE PHILLIPS ROCK DRILL CO.,
PHILADELPHIA, PA.



ARE YOU IN THE MARKET FOR

Rock Drills?

If you wish to buy, write us.
You can save money and get better results by purchasing one of our

"EUREKA" ROCK DRILLS.

The automatic features and economy of operation places this Drill at the head of the market. It is second to none in capacity, and has advantages in construction not to be found in others.

Catalogues, with full description, furnished on application.

THE JOHN M. ROGERS
Boat, Gauge & Drill Works,
GLOUCESTER CITY, N. J., U. S. A.

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marble above. There are 2,000,000 cubic feet of marble in sight with 40,000 cubic feet ready to raise and lift.

The company claims for its marble that it has high crushing strength; that it is entirely free of pyrite, and is non-absorbent of moisture, challenging in these respects any stone found in the United States. They have a hundred ton derrick with 180 feet radius at the marble opening, and one forty ton with 140 feet radius at the granite opening. They are installing a new sawing and finishing mill to be run by electricity, which, when finished, will be the most complete and modern in the country. Each machine will have its individual motor. They have their own tracks and locomotives running between quarry and mills, and without rehandling tracks run into the finishing shed and deliver the finished stone to the railroad. Intelligence of a high order guides the management and we believe substantial success is before them.

BUSINESS CHANGE.

At a special meeting of the directors of the Consolidated Pneumatic Tool Company, held January 31, 1898, Mr. George Cohen resigned his position as General Manager, and was succeeded by Mr. George T. Hartford, of Boston.

We have received a booklet, which is a condensed edition of the catalogue of air compressors made by the Ingersoll-Sergeant Drill Company, Havemeyer Building, New York. It contains illustrations of various types of compressors and gives lists of some of the users of these compressors. This is a handy little volume that a great many of our readers would be pleased to have, and they can obtain it by applying by postal card.

A NECESSARY PART

Of the equipment of every stone-cutting shop are chain hoists and hand power cranes. They are as essential as the yard derrick or the crowbar. We welcome back to the advertising pages of STONE this month a manufacturer of these appliances, whom we had the pleasure of introducing to the trade a number of years ago, when the firm name was different, and location of the concern was at Milwaukee—the Moore Mfg. Co., now of Cleveland, O. Most everybody who has a list of chain-hoist manufacturers to refer to will find the name of Moore conspicuous thereon. The Moore hoists, blocks and cranes have been on the market for many years, have stood the test, and are as highly prized by users now as they ever were. Put yourself in correspondence with this firm. They have some excellent reading matter to distribute gratis.

A pamphlet just issued by the Lincoln Iron Works, of Rutland, Vt., is devoted to a lucid explanation, with illustrations, of the stone planers built by the company. This company has expended much time and labor in the development of the practical machines which it produces.

GIVING AWAY A PUMP FIXTURE.

John Maslin & Son, Jersey City, N. J., in order to introduce their improved air valves, flat and ball rubber valves, neck pieces, etc., are presenting free to all users of Pulsometer pumps, a very valuable attachment. All that is necessary is to send them the size and number of your pump, that is the size of suction and discharge pipes.

THE "BADGER" DRILL.

We are informed by the Phillips Rock Drill Co., of Philadelphia, Pa., their "Badger" drill is steadily making headway in the market; that a number of them have been sold since the first of the year; that inquiries are being received right along, and that the outlook for future business is quite promising.

This drill has been on the market long enough to test its qualities, and to place it outside of the experimental stage. It has some new features, and many good points, not possesed by other drills. Shipments have been made on orders from Maine, Massachusetts, Connecticut, Pennsylvania, New York, New Jersey, Virginia, Colorado and South Africa, and orders are now being booked for Utah and New Mexico.

The drills are doing good work, are giving satisfaction, and have been able, in competitive tests with other drills of older reputation, to justify the claim made for them by the manufacturers.

Catalogues and further information can be obtained by writing to the home office as above.

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HANDY WAGON COMPANY



This is our Twenty-Ton Roller Bearing Truck, with Endless Screw for Loading

NOTES FROM QUARRY AND SHOP.

The amalgamation of the New York and Brooklyn branches of the Granite Cutters' National Union has been completed. The action of the two richest granite-cutters' union in the state will have an important bearing on the trade, and will set the pace for other unions similarly situated, and other amalgamations of the stronger unions are looked for and will considerably augment the power of the organized building trades in the enlarged city. The immediate result of this amalgamation of the granite cutters is the demand for an equalization of wages and hours of work throughout the district controlled by the new union, which includes besides Manhattan and Brooklyn boroughs, Hoboken, Jersey City, Flushing, Westchester county and the surrounding towns. A feature of the case is that the granite cutters' union has not asked the employers for a raise in wages, but has simply notified that on and after April 1 next the union scale of wages will be $4 a day for eight hours' work. The new union is one of the best organized trades in the country. W. J. O'Brien is the business agent.

Mr. Fulmer, of the firm of Crisswell & Fulmer, marble dealers of Lisbon, O., has been looking for a location and talks of starting in business in Toronto, O.

A good roads bill has been introduced in the Ohio legislature. It applies the referendum principle, giving the people a chance to vote not only on the levying of the necessary tax, but also to select the piece of road to be improved. The bill also provides for employment of convict labor in qurrries to be operated by the commissioners to furnish the necessary materials, and gives judges the right to sentence prisoners direct to the quarries instead of the penitentiaries. If materials for macadamization can be purchased cheaper than through contract to lowest bidder, such can be done. At the close of every year there is to be a settlement between township trustees and county commissioners. The method of selecting roads to be improved is peculiar. The trustees are first to decide which are the worst three pieces of well traveled road in the township, then the people are to choose one of the three by vote, and it is to be improved two miles at a time.

Clarendon, N. Y.—In view of the marble plant, which will probably be established here in the spring, steps have been started to incorporate the village, which can be done, as the population is 307.

Munnsville, N. Y.—It is said that the stone quarry at the lime kilns, which has not been operated for two or three years, is to be run so far as stone digging goes, and that a company is about to begin shipping stone to the canal to be used in its improvement.

Dyersville, Iowa.—Frank Vorwald, living near Colesburg, will open up a stone quarry in the spring.

Rimer, O.—J. J. Guffy has purchased the interest of Samuel Swisher in the stone quarry here. Mr. Guffy now has full control of the quarry and is negotiating with the railroad company for a switch.

New York City.—Vice Chancellor Stevenson, of Jersey City, has decided in effect that the union labels designated to indicate fair-made goods are not privileged trade-marks and might be copied with impunity by anybody. It also declares unconstitutional all trades-union label laws in New Jersey. The litigation over the question has been going on for a year or more.

Chilled Steel is made by polishers. Best material only supplied. Townsend & Townsend, 156 Fifth avenue, New York.

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We [illegible] A [illegible] a
[illegible] a "New In
[illegible] Rock Drill

An order for 3 additional Drills
is the result. Mail us [illegible]
[illegible] Works at [illegible], N. J.



THE "NEW INGERSOLL"

WRITE FOR CIRCULAR.

Air Compressors Rock Drills Coal Cutters

The Pohlé Air Lift Pump.

The Ingersoll-Sergeant Drill Co.,

HAVEMEYER BUILDING, N. Y.

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Plainfield, N. J.—The marble and granite business heretofore conducted by J. E. Townsend has been disposed of to C. M. Travis, of New York State. Mr. Townsend will remain. The firm name will be C. M. Travis & Co.

Carlisle, Pa.—A London company, it is reported, has purchased a large tract of land in the vicinity of Carlisle, from which it is expected good slate material for roofing can be procured. The product of the quarries will be shipped direct to London wharves.

D. C. Farrington has attached the Elite Granite Company's plant at Barre, Vt., for back pay, and the company in return has sued him for a final settlement, and damages in not fulfilling his contract.

The crew of 130 men now employed in the quarry at Sandstone, Minn., has not missed one working day of ten hours since last October.

Barre, Vt.—The Granite Manufacturers' Association have voted to point all stone for polishing, instead of pean-hammered, and to make the price 10 to 15 per cent. cheaper per superficial foot. The hours of labor will be from 7 to 5 o'clock on five days of the week and on Saturday five hours, except from April 1 to May 1 and November 15 to December 1, when it shall be optional with the manufacturers whether they shall work the other half-day on Saturday. The price for lettering with pneumatic tools and prices on vault and building work was raised 10 to 15 per cent.

Morrisville, N. J.—The quarries at Edge Hill Grove, which were in operation the past two years, have been abandoned. All the machinery and quarried stone have been taken away and the place looks deserted. The best of the stone has been taken out of the old grove property, but there are thousands of tons in the place yet that are good for the foundations of vitrified brick pavements. It is said a reason for abandoning the quarry was that it was too far away from a railroad.

Genessee, Wis.—The Wisconsin Stone Quarry Company have a large number at work at their quarry getting ready for the spring trade.

A New York stone-cutter received the following epitaph from a German, to cut upon the tombstone of his wife: "Mine wife Susan is dead. If she had lived till next Friday, she'd been dead shust two weeks. As a tree falls, so must it stand."

The Virginia soapstone quarry, at Howardsville, Va., is now running both night and day forces. The day force is engaged in the regular work, and the night force is opening up a new quarry.

The stone quarries east of Bainbridge, Pa., are employing a larger force at present than for several years past.

Ventura, Cal.—The Ojail Valley Railway now affords great facilities far the development of a brownstone quarry. A whole mountain of the stone is located about six miles from Ventura, adjoining the track of the railway. This brownstone is of a substantial nature, and is said to be far superior to the Arizona stone, which is imported into Los Angeles for building purposes in large quantities. The Ventura Bank building was constructed of this material, and it is also used in the San Francisco Chronicle building.

William Bachman, a tombstone maker at Pine Bluff, Ark., is in jail, charged with stealing a tombstone from the cemetery and working it over for the purpose of selling it again.

A Newark, N. J., firm, that of Passmore & Meeker, has recently had to use material which came to it from a great distance, from the Holy Land, in fact. In the stone work around and beneath the Coles monument, in Washington Park, are nine pieces of stone that were brought on the backs of camels from Jerusalem and thereabouts to the coast. They were conveyed in this manner because the British then controlled the other means of transportation, and it was believed that the stones would never get by the soldiers. Two of the largest pieces had to be divided in half. They are used for the corners of the stone work, and while the work was in progress at Washington Park many people wondered why the corner stones had been thus divided. It was because they were too large for one camel to carry, so there was nothing to do but to divide them. These pieces came from the town of Tiberius, by way of the Red Sea. Two other pieces came from Bethlehem, two from Jerusalem, two from Nazareth and one from the Mount of Olives. Then there was the most costly piece of all, which was taken from the top of the celebrated pyramid of Cheops, from the apex stone

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TO INVESTORS!



Working Capital is required to Carry the business and meet the Growing demand for the products.

Everything strictly right and Honest in this offer. . .

Publishers of "STONE."

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itself. This fragment now rests on the Plymouth Rock stone beneath the pedestal on which the bust of the late Dr. Abraham Coles stands.

There is marble enough on the eastern slope of the Sierras to build a forty-foot wall around California, yet marble is imported to the state for building purposes.

The Machias (Me.) Republican says the value of the stone, at first cost, which was shipped from the Jonesboro quarry last year has amounted to $65,000, as estimated by those who have filled out the geological report for the ensuing year. Over one hundred men have found employment at the quarries and mills.

Ex-Mayor John H. Jacobs has resumed the stone business at Marquette, Mich. In 1891 he sold to his partners his interests in a quarry which he started in 1870.

Knoxvile, Tenn —The marble quarries at the forks of the river just above the city are running full time, with a full force of men. A gentleman who was in that vicinity the other day said that more work is being done there now than has been done for several years. The demand for Tennessee marble comes from various sources. The prospects for continuous work is good.

Delta, Pa.—For a hundred years the slate rubbish from our quarries has been an expensive nuisance. We are glad to learn that parties have been negotiating for this rubbish to make it into articles of commercial value.

South Ryegate, Vt.—The new granite firm is to be known as the Ideal Granite Company. They have purchased a quarry and plant of the Blue Mountain Granite Works for $3,000, and will commence business in the very near future.

In the mountains of Holcomb Valley, California, is a quarry of beautiful marble covering at least a quarter section, and many fine specimens are found easily accessible in other places. An excellent quality of sandstone is found in the foothills, and clay suitable for building is abundant. Black marble is found in large quantities, as well as some jaspar.

Pittsburgh, Pa.—Delegates from five locals of the Stone-cutters' and Masons' unions met to consider what the pay and hours per day for the coming year shall be. The reports of the delegates showed that the contractors of the two cities are practically unorganized, while the stone-cutters and masons are in good shape. Many of the delegates spoke in favor of asking for a decrease in the working hours instead of making a demand for increased pay per hour. The wages paid at present are 35 cents an hour, nine hours being considered a day's work. Other delegates favored making a demand for 40 cents an hour, an advance of 5 cents an hour, equivalent to 45 cents a day, and to let the question of working hours rest. There was some talk of asking for an increase in wages, and at the same time a reduction in hours from nine to eight, but this was dismissed as impractical at present. Some of the delegates reported that the more prominent contractors were willing to grant the demand for an increase in wages. The concensus of opinion of the delegates was to the effect that whatever changes are wrought must be accomplished by peaceable methods. There is no danger of a strike nor unfriendly disputes, as the workmen say the greatest harmony exists between them and the bosses, and they want it to continue so.

Greensburg, Ind.—A union of the stone men of Decatur county has been effected. It will be known as the Stratified Stone Company. Officers elected: President, John L. Scanlan, of St. Paul; vice president, A. A. Magee, of Greensburg; secretary, John J. Puttmann, of Newpoint; treasurer, Ira J. Hollensbe, of Greensburg. The headquarters will be in this city.

Grant's monument, at Riverside, in spite of its divine situation by the opaline vistas of the river, is a chill marble disappointment. One is reminded of the Invalides, robbed of its warmth of color and its spaciousness. A mausoleum of ice, with dome above and pit in the center, would be as cheerful and heartsome a place to lie in. This pit for the huge sarcophagi is another hint from the Invalides. But while Napoleon seems to lie in shrine in the heart of France in a kind of ruddy glory, our own great soldier seems let down into an arctic resting place. The huge receptacles of Wisconsin granite, the only color that chills, have a suggestion of mahogany.—Chicago Post.

For sawing purposes there is no material on the market that can surpass the chilled steel. Samples sent free upon application Townsend & Townsend, 156 Fifth avenue, New York.

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THAT IT HAS DEVELOPED [illegible]

THAT IT IS PREPARED [illegible] Three Hundred and Fifty Dollars and Fifty Cents per Tool.

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THIS COMPANY INAUGURATES [illegible]

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The Consolidated Pneumatic Tool Company,
1404 Bowling Green Building,
NEW YORK.

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Covington, Ind.—Work has just been begun in opening up at Fountain, this county, the largest stone quarries in the state. Harvey Hagle, of Attica, is superintending the work. The interests of Messrs. Brooks and Cox have been purchased by Mr. Richard H. Gyer, of Lafayette. The quarries are located on Bear and Rattlesnake creeks, and on the Covington branch of the Wabash road. They will produce brown, old gold, and white stone. Attica will be the headquarters of the company, which will soon be ready to employ a large number of workmen.

The Ittenbach & Co. Stone Company, of Indianapolis, Ind., has recently put in operation the largest stone planer in this country, and the plant of gang saws, planers, etc., is said to be one of the most complete in this country.

Sandstone, Minn.—Increases in the quarry force have been going on until it now numbers more than 150 men, thirty of whom are paving cutters aud thirty-five stone.cutters. The employment of so large a force is partly due to the open winter that enables operations in the quarry to be carried on with almost as small expenditure for labor as in the summer, but there is also the fact that the company has orders for stone as well as that Kettle River sandstone can be quarried in winter without fear of having the blocks taken out broken by the freezing of the quarry sap that are factors in such extensive operations at this time of the year. A new 60-16, 100-horse power boiler is being put in place in the engine room at the mill.

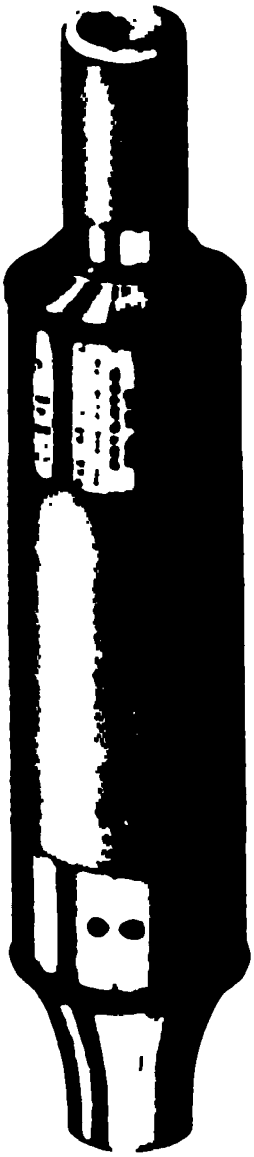
The chief of the St. Regis tribe of Indians, of Franklin county, New York, and Interpreter Shaw have appealed to Governor Black to set aside a contract entered into between the tribe and Sooy Smith & Co., of New York City, for the quarrying of stone on the St. Regis reservation. The Indians claim that the New York firm is not fulfilling its part of the contract directing that all work, except masonry, shall be done by the Indians. All the quarrying and hauling, they claim, is being done by white men. The governor referred the chief and the interpreter to the attorney general, who advised them to lay the case before the Indian agent. The contract is very loosely drawn and the agreement that the Indians should have a prior right to the work is said to have been simply a verbal understanding. The tribe feels that it is being imposed upon outrageously.

"The Philadelphia branch of the Granite Cutters' National Union has 225 members, but there would be easily 550 men employed in Philadelphia cutting granite if the provision I have mentioned in the New York law were incorporated in the municipal law here," said Secretary Duneau of the National Union in an interview. "Steps will be taken at the earliest opportunity to amend the present ordinance to that extent. The granite cutters are emphatic in their statement that this provision would add nothing to the actual cost of municipal work, for the reason that contractors, in bidding for municipal work, would base their estimates upon the prevailing local rates of wages. The advantage which contractors at present obtain by hiring cheap alien labor simply enhances the contractors' profit without in any way reducing the cost of municipal improvement. The Philadelphia branch will secure a copy of the New York law and will have it incorporated in the Phi adelphia ordinance on this subject. A noticeably good result of the New York law is that this winter there is more stone-cutting in that state than has been done heretofore, even in the busiest summer season, and from a conservative estimate, formed from a knowledge of the work already contracted for in New York State, it is safe to say that during the coming summer there will be double the number of stone-cutters previously employed there. In Philadelphia granite cutters receive $3 per day. In Greater New York they are paid $4 per day, and the latter has been the standard rate of wages there for the past six years. In Albany they get $3.60, and in the rest of the State of New York their wages average $3.40 for a workday of eight hours.

The Tippecanoe Pulp and Grindstone Company was incorporated Feb. 21 under the laws of West Virginia. Capital, $100,000. At a meeting of the stockholders, held in Cleveland, O., March 2 the organization was completed and the following officers elected: C. T. Raymond, president; E. Smallwood, vice president; A. F. Weaver, secretary; W. B. Hanlon, treasurer. The office of the company will be 221 Hickox Building, Cleveland, O. They will operate the quarries located at Tippecanoe, Harrison county, Ohio, and confine their attention principally to the manufacture of stones for grinding wood pulp. The company starts out with several large orders, and very good prospects of a large business.

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For Carving, Lettering and Cutting **Marble, Granite**, and all varieties of hard and soft **Stone**, are built entirely new lines, and they are covered by patents that were granted without a single reference to any other pneumatic tool or patent in existence.

This can not be truthfully said of any other pneumatic tool on the market.

Our tools are the best because they are the **Best**, as they are the **Most Powerful, Most Durable,** and the **Simplest Tool** on the market.

They will do 3 times more work in a given time than any other tool, because of their rapidity of stroke, and when you start cutting it is the straightest, smoothest and finest letter [illegible] as they do not "chatter" in the least.

As only the very finest mechanical parts and the very best material are used in the construction of our tools, we have no hesitancy in guaranteeing them against defects for

TWO YEARS

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THE CLEMENT PNEUMATIC TOOL COMPANY.

123 and 125 South Eleventh St. PHILADELPHIA, U. S. A.

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Circleville, O.—C. F. Anderson, of Springfield, Ill., has purchased the Harsha marble and granite works in this city.

Attica, N. Y.—Andrew G. Krauss and Burt W. Rice have purchased the business and stock of C. E. Kempstein.

Fredericksburg, Va.—The Fredericksburg Marble Works, which have for some time been quarrying and shipping to Northern markets the excellent granite which abounds in inexhaustible quantities near this city, has changed hands. A new company, composed of Northern capitalists under the general management of Mr. A. D. Young, of Barre, Vt., have begun operations. The present works will be improved by new derricks, shafting, etc. The general office will be located here, with branch offices in Barre, Vt., and Philadelphia.

The Toronto (Ont.) Granite Company, Limited, has assigned. There is talk of a dividend of 20 cents on the dollar.

Hoopeston, Ill.—The marble firm of Johnson & Trough has dissolved, Mr. Johnson retiring.

The Galena (Ill.) marble firm of Ivy & Vincent has been dissolved, Mr. Ivy retiring.

The firm of J. E. Gould & Co., composed of J. E. Gonld and D. W. Parish, doing a general marble and granite business in Tyler, Tex., has been dissolved by mutual consent, D. W. Parish retiring. J. E. Gould will continue the business, assuming all liabilities and collecting all accounts.

The crushing plant of the New England Trap Rock Company, located about three miles east of Westfield, Mass., was sold at foreclosure sale, the purchaser being N. A. Harwood, of Chester, who holds the mortgage. It is understood the company is to be reorganized and the plant pushed to its full capacity next season.

The Lincoln Monument Company, of Lincoln, Ill., has been changed and reorganized, Adolph Rimerman retiring. The business will still be continued under the direction and management of W. D. Gayle.

Raleigh, N. C.—The Carolina Soapstone Company is the name of a corporation formed for the purpose of mining and manufacturing and selling talc, copper and other mineral ores in Moore and Chatham counties, with branch offices elsewhere in North Carolina and other states. This company was incorporated for a term of thirty years, with a capital stock of $12,000, with power to increase it to $100,000. The incorporators are: O. E. Maltby, John W. Hinsdale, A. P. Massey, W. B. Snow (trustee) Argo and Snow, F. H. Busbee.

The Arnold Granite Company, of St. Cloud, Minn., filed articles, with Walter Arnold, C. W. Hertig and G. W. Stewart as incorporators. The capital stock was placed at $50,000. Walter Arnold owns 496 shares, C. M. Hertig 2 and G. W. Stewart 2.

Agamenticus Granite Company has been organized at Portland, Me., for the purpose of dealing in granite, with $100,000 capital stock, of which nothing is paid in. The officers are: President, J. Woodbury Pinkham, of Wollaston, Mass.; treasurer, Geo. E. Hanson, of Somersworth, N. H. Certificate approved Jan. 26, 1898.

Illinois and Wisconsin Stone Company, Chicago, Ill.; capital stock, $5,000; incorporators, John M. Cameron, Thomas R. Beamon and John H. Coulter.

Paterson, N. J.—John Agnew, of this city, Robert Muirhead, of Jersey City, and Frank A. Kilgour, of Passaic, have bought the Parker's Glen bluestone property on the Erie road near Shohola Glen. It comprises about 8,000 acres of valuable bluestone land, a mill and seventeen or eighteen buildings. The new proprietors will go into the bluestone business on an extensive scale.

Williamstown, Vt.—The new granite firm of Carter & McNichol will leave here at the end of this month and go to Gouldsville, on account of the better facilities offered them for their work.

The Portage Entry Quarries Company, Chicago, has purchased the Ashland Brownstone quarry located on Presque Isle, one of the Apostle Islands.

A. H. Stehr, of Humboldt, Tenn., has purchased Melnotte & Snyder's marble yards at Milan and consolidated them with his Eclipse Marble Works.

Golden, Ill.—Thomas & Rhea have sold their marble and granite works to Heinburger & Wallace, who will in the future conduct the business.

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Trenton, Mich.—The stockholders of the Sibley Quarry Company have elected E. Dwight Church, president; E. Dwight Church, Jr., vice president; Austin Church, secretary, and K. J. Sundstrom, treasurer and general manager.

The Vermont Marble Company, of Proctor, Vt., has obtained the contract for the interior finish in Rutland white marble of the Albany Savings Bank building. The price to be paid for it will be nearly $25,000.

Greensboro, N. C.—An immense bed of valuable granite has been discovered on the north side of the State Normal and Industrial College reservation. It is but a few inches beneath the earth's surface.

Milwaukee, Wis.—In addition to the purchase of land in the Menominee valley by the Grant Marble Company, the company has also bought a large piece of land adjoining. The entire recent purchase of Mr. Grant in the valley where his works are located amounts to abont ten acres in extent, and in all his company has invested between $70,000 and $80,000 in land there.

Marquette, Mich.—The Burt freestone quarry, which has not been worked for years, will be opened again. Ex-Mayor J. H. Jacobs has secured the property. Mr. Jacobs is the pioneer stoneman of the Upper Peninsula.

The Chase County Stone Company, whose quarries are two miles east of Cottonwood Falls, Kan., have secured the contract from the A. T. & S. F. R. R. Co. to furnish the stone for all the masonry work to be done this year on the western division of their road, and J. E. Duchanois has left with tools and two gangs of men to open up quarries at Caddoa, Col., and Las Vegas, New Mexico, to begin on the contract.

Kirby, Wis.—Geo. Vandervort has opened up a stone quarry on his farm.

It is reported that the farm of Alpheus Sims, near Sylmar, Md., has been sold to parties who will open a spar quarry on the premises.

Herndon, Va.—A. M. Mullen has established marble and granite works.

Chicago, Ill.—The plant of the Chicago Portland Cement Company at 34th street and 45th avenue burned. Loss, $100,000. Ralph Gates.

Joliet, Ill.—Isaac Nobes, a pioneer stone quarryman of this section, died Feb. 9.

Utica, N. Y.—Edward Callahan, stone, deceased.

Faith, N. C.—George Fisher is developing a quarry of snow white granite.

Buffalo, N. Y.—M. H. Phillips has been appointed receiver of the Medina (N. Y,) Sandstone Company. The appointment was asked for, as proceedings have been begun for the voluntary dissolution of the concern.

Washington, D. C.—The New York Quarry Company, upon a judgment for $14,000, filed a creditor's bill against Edward L. Dent and fifteen other defendants. The court is asked to set aside certain conveyances as void as against Dent's creditors, and to subject his property to sale under the terms of an assignment made by him to W. A. Gordon and J. H. Taylor some years ago, and which the complainant alleges has not been carried out by the trustees.

Ellsworth, Me.—The case of George A. Campbell vs. Chase Granite Company was concluded, the jury bringing in a verdict for the plaintiff in the sum of $500.

Martinsburg, W. Va.—George W. Shaffer has brought suit against the Standard Lime and Stone Company, of this place, for the sum of $10,000, for injuries received while at work in the company's quarry last summer.

In the case of John W. Underhill, assignee of the Acme Slate Company, of Wind Gap, Pa., vs. Conrad Miller, William Harding, Sr., and Joseph H. Schull, trustees for certain creditors of the Acme Slate Company, a rule to stay execution on a judgment note for $12,000, the master, J. W. Wilson, Esq., filed a report in court recommending that a decree of court be entered requiring the defendants to present releases to the assignee for all debts of the Acme Slate Company, and pay all costs and counsel fees, otherwise the execution shall be issued.

Augusta, Ga.—C. F. Kohlruss, monument dealer, entire stock being offered for sale, below cost, in consequence of change in business.

The Davenport (Iowa) Stone Company has bought out the monument establishment of Cass & Loraine, M. J. Malloy, manager for the company, will have charge of the establishment.

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THE WARDWELL
Steam Stone Channeling and Quarrying Machine

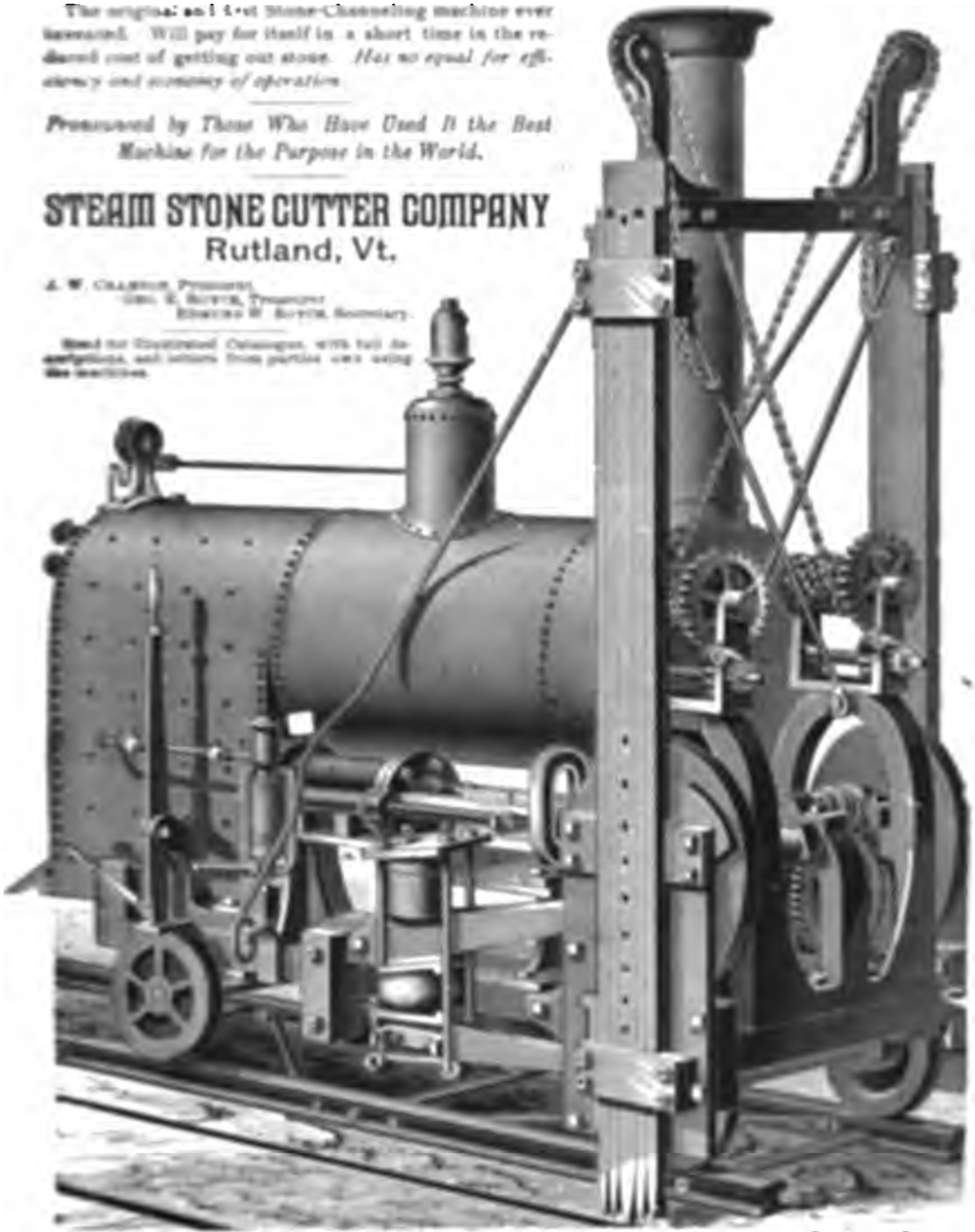
The original and first Stone-Channeling machine ever invented. Will pay for itself in a short time in the reduced cost of getting out stone. *Has no equal for efficiency and economy of operation.*

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STEAM STONE CUTTER COMPANY
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GEO. E. BOYCE, Treasurer.
EDWARD W. BOYCE, Secretary.

Send for Illustrated Catalogue, with full description, and letters from parties now using the machine.



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Ashland, Wis.—The Ashland Brownstone Company has leased its quarries and outfit at Presque Island and Superior to the Portage Entry Quarries Company, of Chicago. This latter company controls the Portage Stone Company and other quarries at Portage Entry and the Marquette and Malone Stone Company quarries in Ohio, also the Heldmaier Bedford quarries at Bedford, Ind. This addition to the Ashland brownstone quarries gives them additional strength. The contract provides that the new company shall operate the quarry to its full capacity.

Glenville, O.—C. B. Baker, stone, etc., reported to have made an assignment.

Hagerstown, Md.—Mr. William J. Witzenbucher, attorney for Mr. George F. Cochnower, of Washington, has filed a bill in the Washington County Equity Court for a receiver for the Cochnower Marble Company, whose works are located at Eakle's Mills, south of Hagerstown. Mr. Cochnower is a creditor for $5,500 against the company. A receiver was appointed for the company recently at Alexandria, Va., where the company was chartered, and these proceedings are auxiliary to the Alexandria proceedings.

Aurora, Ill.—George McDonald, for years with T. Otto Fisk in the marble business, has gone into partnership with Ferd Zimmer.

Reedsburg, Wis.—S. A. Collins has purchased the entire stock of marble from the Elroy Marble Works.

Rossburg, Ind.—Will Hollensbee has sold his quarry to the Big Four Stone Company, of Newpoint.

South Ryegate, Vt.—The firm of W. D. Darling & Co., granite dealers, has been dissolved. Mr. Darling will continue in the business and will still have charge of the management.

Chicago, Ill.—A new concern, the Dolese & Shepard Company, has been organized to consolidate the Chicago and Naperville Stone Company and the Dolese & Shepard interests. T. P. Phillips is the president and the largest stockholder. He bid in the Hawthorne property of Dolese & Shepard offered under foreclosure decree for $5,000. He has bought from the Illinois Trust and Savings Bank the Torrence tract of thirty-three acres, which was a part of the Dolese & Shepard plant, for $70,000 cash. This property was bought at foreclosure by the bank some time ago. The new concern will continue the quarries operated by the old companies.

Rushford, Minn.—Peasley & Henderson, marble, succeeded by Peasley & Jacobson.

Roseburg, Ore.—Gillette & Co., marble, succeeded by H. L. Marston.

Jones Bros. and C. E. Tayntor & Co., the two largest granite companies in Barre, Vt., have formed a consolidation by which Jones Bros. assume the management of the Tayntor quarries.

Lowellville, O.—A Leetonia company have purchased the Lowellton Limestone Company's business. It will be an incorporated company. George Erskine has charge of the business at present.

H. A. Duffy has sold his quarry at Graniteville, Vt., to E. L. Smith & Co. The latter firm will unite this quarry with two others of their own which are adjoining. Mr. Duffy will continue in the granite business.

Blair, Neb.—T. M. Carter has sold an interest in his marble works and undertaking business to Mr. E. G. Hubler, late of Marshalltown, Iowa.

Boise City, Idaho.—Articles of incorporation of the Boise Stone Company, capital $25,000, have been filed with the Secretary of State. The directors are Harry C. Wyman, Annis E. Wyman, John S. Jellison and Edward A. Jellison.

Birkenstock Marble Company, of New York City; capital, $10,000. Directors—A. M. Heinsheimer, B. D. Traitel and J. W. Birkenstock, New York City.

Marquette Cement Company, Chicago; capital stock, $250,000; incorporators—William W. Gurley, Will H. Clark and Howard M. Carter.

The Derbyshire Falls Stone & Cement Co., Indianapolis, Ind., $50,000. J. M. Wheeler, E. C. Minton, J. B. Pusey.

Rockville, Conn.—H. T. Anderson, marble, succeeded by Anderson & Watts.

C. H. Barnard, of the Canton (Ill.) Marble Works, has sold his interest in the works to his partner, J. S. Addis.

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Amalgamation has wiped the Kings county branch of the Granite Cutters' National Union out of existence. It has also performed a similar office for a sister organization which was known as the New York County Branch of the National Union. Both unions are now one. The title of the new union is "The New York Branch of Granite Cutters' National Union." An equalized wage scale of $4 for a day's work of eight hours will be demanded by the union for its members, to commence on April 1, in the boroughs of Manhattan and Brooklyn.

Barre, Vt.—At a special meeting of the Granite Manufacturers' Association, the joint committee appointed from the association and the Cutters' Union to fix a bill of prices for the coming year made its report, which was accepted with slight modifications. The utmost harmony prevailed. The price on building work was raised 10 per cent. The association voted to ask the Cutters' Union to make nine hours a day's work and that Saturday afternoon should be a half-holiday, except for the three months preceding Memorial Day. There is no doubt but what these two organizations will agree to these minor amendments to the general bill of prices.

Appleton, Wis.—Bert Krautsch, of Green Bay, and an Appleton man whose name could not be learned, will open up a marble store in this city in the near future.

George Killuder was given a verdict for $800 at Dartford, Wis., for injuries resulting from a defective derrick in the quarries of the Berlin and Montello Granite Company.

Philadelphia, Pa.—A bill in equity has been filed by Edward J. McIvor against the Crescentville Stone Company, asking the Court to "appoint a receiver to collect and recover for the defendant corporation any and all amounts which the officers and directors or any former officer or director of the defendant corporation may owe to it." He also asks that the corporation and its officers shall be restrained from interfering in any way with the receiver. Mr. McIvor says he is a stockholder in the defendant company, and he charges mismanagement on the part of its officers.

Ridgway, Pa.—Will have a new industry in operation shortly, which will employ at least a dozen men. A firm from Emporium will build and operate marble works near the Ridgway Manufacturing Company.

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MADE TO BREED.
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The Best and Cheapest Abrasive for
Sawing Stone.
CIRCULAR AND SAMPLE FREE FROM
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THE KENNESAW MARBLE COMPANY,
MARIETTA, GA
GEORGIA MARBLE ITALIAN
For
Monumental and Interior Purposes.

MACHINERY
FOR SALE—CHEAP FOR CASH.
Hoisting Engines. Air Compressors, Rock Drills, Rock Crushers, Dump Cars, Channeling Machines, Steam Pumps, Steam Shovels, Light Locomotives, etc., all in good condition
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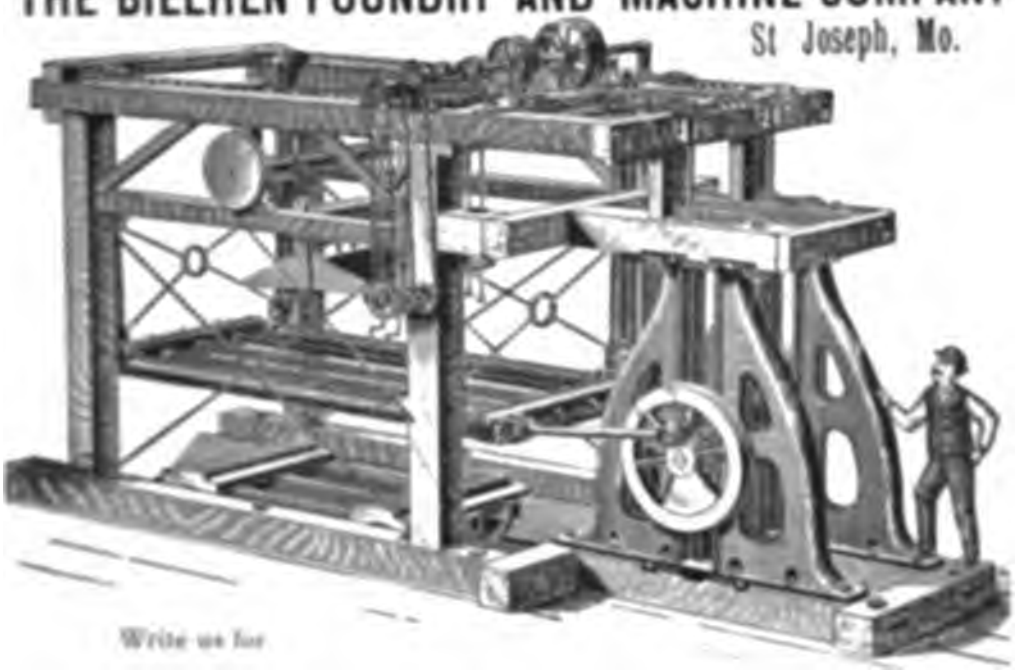
Building only a practical running line, and upwards of twenty-five years' Steam Pumps and Gauges are specialties with us, but our line covers about everything used in the trade. A little Booklet, a record one, would no doubt enlighten you—shall we mail it?

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THE BIELHEN FOUNDRY AND MACHINE COMPANY

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Stone Saw-Mill Machinery

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Middlebury, Ind.—Henry Chaney and Jerome Collins will open and operate a stone quarry on the Chaney place, a part of the old and original Cooprider homestead.

The large stone quarries will be reopened at Portage, N. Y., in the spring, by several capitalists of Rochester. The stone is said to be the best found in the county. The work will give employment to a large number of men.

It is reported that a new quarry is to be opened in New Lenox, Mass., on land adjoining the Auchmuty estate. A side track has been surveyed from the Consolidated road to the quarry.

A couple of gentlemen are in correspondence with some Bradner, O., people in regard to opening a lime kiln and stone quarry here. They will donate labor and money with which to help them uncover the ground, and get ready for business.

S. Henry Barnicoat, a well known granite dealer of Quincy, Mass., died at his home in that city February 26. He was 37 years old, and had been engaged in the granite business in Quincy for several years. He leaves a family.

Portsmouth O.—C. C. Bode & Son have opened a new marble shop.

Portsmouth, O.—The McDermott Stone Company has been organized here. The new company has acquired large tracts of land ten miles from this city. A new town has been laid out. It is called McDermott and a postoffice has been asked for. By the first of April over 500 men will be at work in the quarries.

Meadville, Pa.—William C. Hay, a well known marble and granite dealer, died at Fredericksburg, Pa., of Bright's disease. He was senior member of the firm of W. C. Hay & Son, Meadville Marble and Granite Works, since the year 1856.

Allan Walton, president of the great brownstone quarries at Hummelstown, Pa., and a prominent business man, known throughout eastern Pennsylvania, died suddenly at Jacksonville, Fla., Feb. 24. His body was laid to rest at Laurel Hill Cemetery, in Philadelphia. Allan Walton was born in Chester county August 24, 1835. He came to Hummelstown in 1867, where he was made superintendent of the Pennsylvania Brownstone Company, now known as the Hummelstown Brownstone Company.

Judge Burnett, of Oshkosh, Wis., has handed down a decision in the Berlin & Montello Granite Company case, holding that the intervening creditors must be paid. The decision is against the Hibernian Banking association of Chicago, which brought the suit. The court ordered the sale of the property in Green Lake and Marquette counties to satisfy judgments.

Chicago, Ill.—H. C. Hoffman & Co., granite, succeeded by D. McGowan, under old style.

Carrollton, O.—George C. Stidger, aged 65, is dead. Cause of his death, pneumonia. Mr. Stidger was well and favorably known over Carroll, Harrison and Columbiana counties, having been an extensive dealer in marble work.

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CONTRACT NEWS.

Peoria, Ill.—Plans are being drawn for the new church of the Christian Science Society of this city.

Gaylord, Mich.—The Catholics are about to erect a fine stone church.

Algona, Iowa.—The Methodists now have over $10,000 pledged for the new church they are going to build this summer. The new structure will probably be built of stone and will cost $18,000.

New Hampton, Iowa.—Arrangements have been made for the erection of a new Catholic church this spring, at a cost of $20,000, which when completed will be one of the finest in the state.

Sheldon, Iowa.—The M. E. Church will build a $12,000 edifice. The Christian Church have a very comfortable building nearly completed. The Baptist Church will enlarge their present structure and the Dutch Reformed will also build.

Orange, Tex.—The Orange county board has authorized $33,500 in bonds, $30,000 to be used in the erection of a court house and $3,500 to be used in repairing the jail and furnishing the court house.

Britt, Iowa.—Josselyn & Taylor, of Cedar Rapids, have prepared plans for a court house, to be erected at Britt. The present court house is unfit for use and is situated at Garwin, one and one-half miles from the railroad.

Mexico, Mo.—The Presbyterian Sociery has decided to build a new church. B. B. Tureman, W. M. Treloar, committee.

Louisville, Ky.—The Trinity M. E. Church will commence work May 1 on the erection of a $50,000 church on the site of the present building.

Philadelphia, Pa.—It is reported that a large opera house, to cost from $1,000,000 to $1,500,000 will be built in the near future. G. Heide Norris, interested.

Cincinnati, O.—Architects are preparing plans for a $30,000 mausoleum to be erected in Spring Grove Cemetery by the Fleischmann family.

New Castle, Pa.—The Standard Brewing Company will build a $60,000 brewing plant. Oscar Beyer, Garden City Block, Chicago, architect.

Columbus, O.—It is proposed to lay the corner stone of the Masonic Temple June 12. Estimated cost of building, $100,000.

Scottdale, Pa.—The First Presbyterian Church will erect a $20,000 edifice.

Brooklyn, N. Y.—The Green Avenue Presbyterian Church, Rev. D. H. Overton, 965 Green avenue, pastor, and Henry R. Mayette, 952 Green avenue, are receiving sketches for the new $50,000 stone church.

Port Jervis, N. Y.—A bill has been introduced by Mr. Schultz in the Senate at Albany, N. Y., appropriating $100,000 for a Normal School at Port Jervis.

Baraboo, Wis.—The Chicago and Northwestern Railway proposes to build a depot this summer.

Buffalo, N. Y.—Plans for a handsome brownstone church, to be built by St. Theresa's parish, have been drawn by Architect A. A. Post. Cost, $35,000. Rev. Francis Kean.

Ithica, Mich.—The Presbyterian Society will build a new church at a cost of $18,000.

Lansing, Mich.—Press report states that a new brewery will be established to cost $50,000.

Grand Rapids, Mich.—J. H. Wagner, 107 Dearborn street, Chicago, has prepared plans for a six-story factory to be erected by the Rindge-Kalmbach Shoe Company at Grand Rapids. Estimated cost, $75,000.

Cincinnati, O.—The Hospital Board will ask for permission to issue $150,000 in bonds for the erection of a new building.

Camden, N. J.—The post-office authorities are contemplating the erection of a handsome granite, stone and steel fire-proof office building. Competitive plans are being prepared.

Pittsburg, Pa.—The directors of the City Deposit Bank have decided to receive competitive plans for a one-story fire proof banking building. J. R. Paul, cashier.

St. Johns, Mich.—The Congregationalists will erect a $15,000 church this season.

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BOOKS AND PERIODICALS.

"GUARDING THE BORDER, OR THE BOYS OF THE GREAT LAKES," by Everett T. Tomlinson, author of "Search for Andrew Field," "Boy Soldiers of 1812," etc. Cloth. Illustrated. Being the fifth volume of War of 1812 Series. Lee & Shepard, Boston. Price, $1.50.

Dr. Tomlinson, in his authorship of this series, has essayed to furnish the young American mind with an accurate historical account of the causes leading up to and the events transpiring during the war of 1812, and he gives a type of juvenile literature that is of incalculable benefit to the youth of the land. Dr. Tomlinson was for years principal of Rutgers Academy, and he is quite conversant with the character of literature that is most desired by the youth, and he is also a judge of the manner of presentation that will best hold the attention of his readers. This is the fifth volume in the above series, and we follow with interest the adventures of the Field and Spicer boys in their efforts for their conntry. The scene of action has changed from the South, where the story of "Tecumseh's Young Braves" was laid, to the Great Lakes, and includes many stirring adventures both on land and water. General Scott, the hero of Lundy's Lane, for the first time appears upon the scene with the army; the trials and delays in building a navy and its later movements upon the lakes are described, and in the reconnoitering and cutting-out expeditions connected with the latter our boys have their full share. Upon the whole the youthful readers of this and the preceding books of the series will have not only an interesting work to peruse, but a correct historical account of many incidents of the war of 1812.

The complete novel in the March issue of Lippincott's in "An American Aspirant," by Jennie Bullard Waterbury. It deals with the fortunes and misfortunes of a spirited young lady who studies music in Paris and hopes to become a prima donna. The moral drawn by the author for such as contemplate similar efforts is, Don't. The Civil Authority is a powerful story of a weak-kneed sheriff, a resolute captain, and a company of the National Guard which attempted to defend a jail against a mob. It is by Henry Holcomb Bennett. Joseph A. Altsheler tells how a Federal and a Confederate soldier were left together "After the Battle," and what occurred between them, "Jim Trundle's Crisis," as described by Will N. Harben, came when the Whitecaps proposed to whip Jim for neglecting his family. George Ethelbert Walsh writes instructively on "The Status of American Agriculture," and its transition from crude to scientific methods. "The Antics of Electricity" are portrayed by George J. Varney. Neith Boyce has much to say about "Historic Diamonds," and Frank H. Sweet about "Pearl-seeking." The Archælogy of Nursery Classics" is traced by Agnes Carr Sage. F. Foster, in "Literary Nomenclature," deals chiefly with the titles of novels. The poetry of the number is by Mary E. Stickney, M. S. Paden, Grace F. Pennypacker, Charles G. D. Roberts, and Clinton Scollard.

Under the title An Apostate Democracy, Appletons' Popular Science Monthly for March will publish a sharp criticism of the degeneration in American methods of government, by Franklin Smith, who has during the past two years achieved an enviable place among writers on modern economics by his arraignment of some of the most glaring of our political and educational abuses.

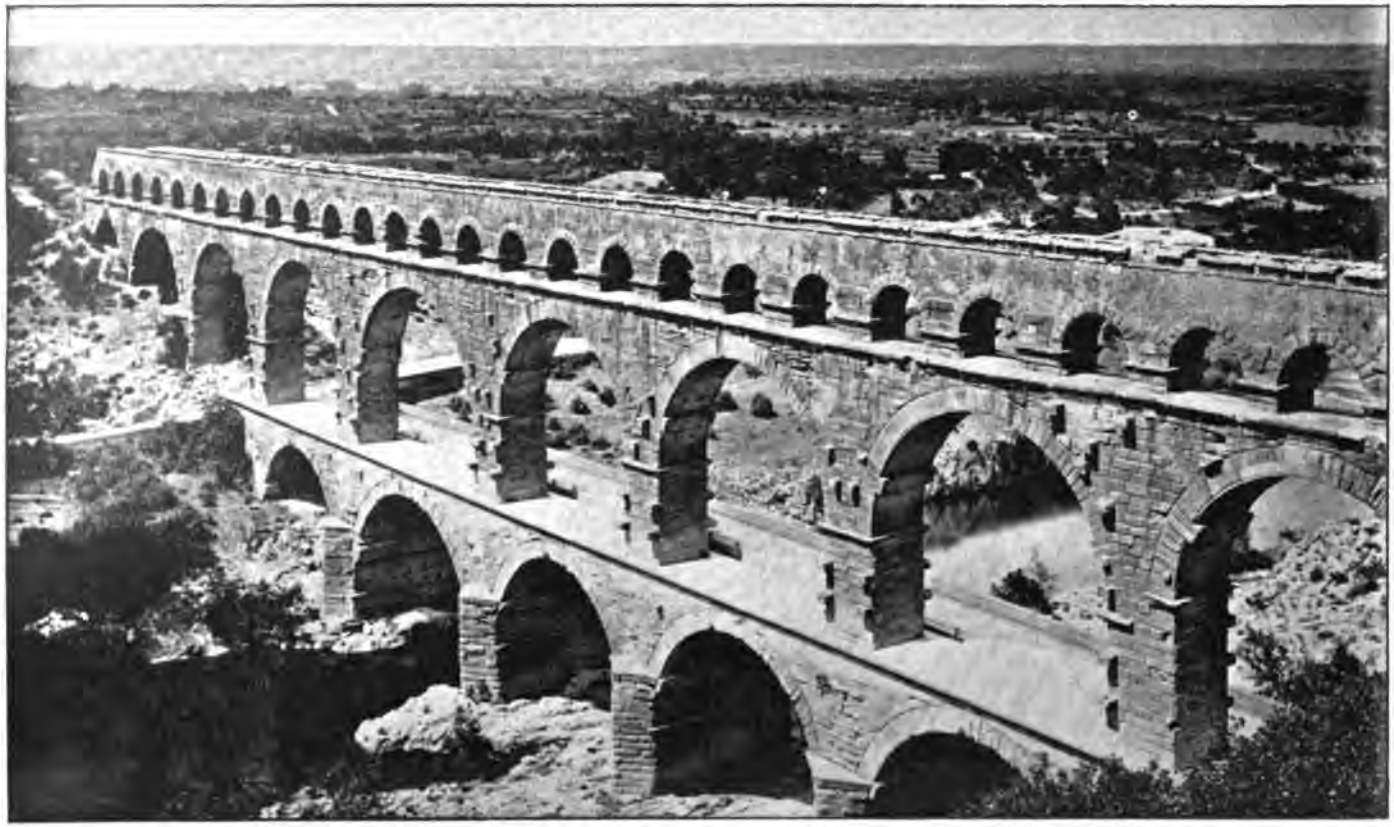
With the March number The Chautauquan initiates a new feature. Hereafter History as It is Made will head the events of the month, which will find their clear discussion in a scholarly article written by a prominent political authority and fully illustrated with appropriate half-tones. This department succeeds that of Current History and Opinion, which proved so popular a feature of the magazine.

"THE UNIVERSAL CARPENTER AND JOINER," by Fred T. Hodgson; with 248 illustration; royal 8vo, bound in stiff paper covers, in five parts. Part I., $1. New York: Industrial Publication Company.

This work aims to instruct the artisan in everything pertaining to carpentry and joining, fitting and wood furnishings for wood, brick, stone, concrete and adobe buildings. The field to be covered is so extensive as to require five parts and upward of one thousand illustrations.

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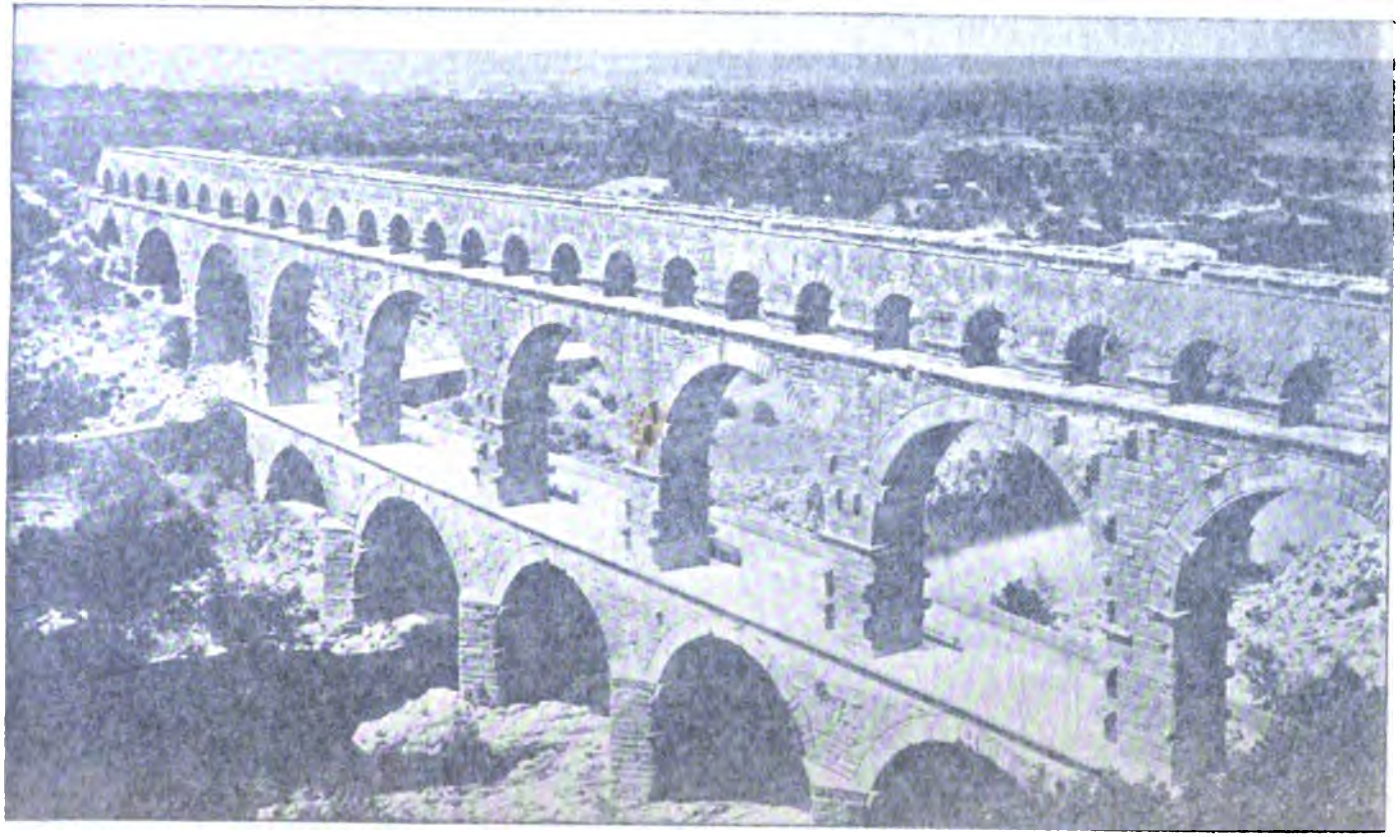
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STONE

VOLUME XXI. AUGUST 1900 NUMBER 2

HISTORY OF THE STONE ARCH.*



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ing that this is not a true arch, the stones being merely strutted against each other, as over the entrance to the great pyramid, and that the underside is cut to the form of a pointed arch. In a small sketch, the Encyclopedia gives a cross-section of the vaulted chamber where the roof-stones are shown extending quite a distance into the masonry back of the side walls. If such is actually the condition, the roof is not a true arch but an arched roof.

Crude arches of brick were found in the ruins of Thebes, which were probably built as early as 2900 B. C.

Beneath the palaces of Nimrod (about nineteen miles below Nineveh, on the left bank of the Tigris river), the ancient Calah, founded 1300 B. C., sewers were found covered with pointed arches of brick.

These arches, contrary to the usual form of to-day, were inclined, and could have been constructed without the use of a form for their support during construction.

The gates to an ancient city in Assyria, now represented by the ruins of Khorsabad, were arched with semi-circular voussoir arches of stone, having spans of from 12 to 15 feet. These are supposed to date as early as the time of Sargon, who founded the city about 722–705 B. C.

One of the most important of the ancient structures in connection with the history of the stone arch is Campbell's tomb of Ghizeh, supposed to have been built 600 B. C. "It is an open excavation, 53 feet 6 inches deep, 30 feet by 26 feet 3 inches on plan, with niches, etc., leading out of it. This excavation is supposed, from some indications left of a springing stone, to have been covered by an arch. If so, this would be the oldest known stone arch of a large size. In fact it is difficult to imagine any other way in which this large excavation could have been covered."

But more interesting and important than this was the tomb, built of good masonry, which was found in the center of "the excavation." The roof was formed of three stones forming a true arch, over which was a perfectly formed voussoired arch of four distinct rings, the inner ring having a span of about 11 feet. These arches were nearly, if not quite, semi-circular.

At about this time the Romans commenced the use of the voussoired arch, as witnessed by the outlet of the Cloaca Maxima, supposed to have been built 615 B. C. (Fig. 2). The arch consists of three concentric rings of voussoirs, the inner ring having a span of about 14 feet.

All records in the form of ruins, tablets, etc., fail to indicate that the true arch was employed in structures to any great extent prior to the sixth century B. C. The arched form, however, was quite common from earliest times, and ruins have been found in all portions of the world.*

One of the best examples of the false arch exists in Greece. It was

*Quite recently a voussoired arch of mud brick was discovered at Nippur (Fig. 26). The date of its construction is placed at about 4000 B. C.

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The details of the more modern Chinese arches do not differ essentially from those employed in other countries.

To the Romans we are indebted for the almost universal use of the voussoired semi-circular arch in bridge construction. From the second century B. C. until the fourth century A. D. the Romans built many magnificent stone arch bridges for roads and aqueducts, the magnitude of which has not since been equaled. It would take too much time to enumerate the many bridges in Rome and in the conquered provinces which were constructed by the Romans, and of which we have either authentic details, or the structure itself, so we will mention only a few of the most important structures.

In the city of Rome and in the immediate vicinity were constructed aqueduct bridges containing immense amounts of masonry, and throughout these the voussoir arch was employed. The following table gives, in the chronological order of their construction, the number of miles of arches used in supporting aqueducts. (Mr. F. W. Blackford, in Journal of the Association of Engineering Societies, December, 1896):

	Date.	Total length of miles.	Length of arches in miles.
	B.C.		
Appia	312	11	Little
Anio Vetus	272–264	43	"
Marcia	145	61	12
Hercules bridge		3	
Tepula	126	13	Little
Julia	34	15	6
Virgo	21	14	Little
	A. D.		
Alsientina	10	22	Little
Augusta	10	6	"
Claudia	50	46	10
Anio Novus	52	58	9
Neronian bridge	97	2	2
Triana	109	42	Little
Hadriana	117	15	7
Sabina Augusta	130	15	Little
Aurelia	162	16	*7
Severiana	200	10	Unknown
Antoniana bridge	215	3	3
Alexandrina	226	15	†7
Totals		410	63

*Restored 1585–1590.
†On arches of Hadrian.

From this it is seen that between 312 B. C. and 226 A. D. sixty-three miles of arched bridges were built.

Pont du Gard, near Nimes, France, [See frontispiece in this issue of STONE, and description, page 444] was built by the Romans during the reign of Augustus (27 B. C.–14 A. D) under the direction of Agrippa. This is an aqueduct bridge composed of three tiers of arches. The lower tier contains six arches. The maximum span is 80 feet 5 inches. Each arc

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is made up of four separate rings, side by side, and not bonded together. The platform of this tier is 20 feet 9 inches wide. The second tier contains twelve arches of about the same span as those in the lower tier, but has only three rings side by side, and is but fifteen feet wide. The upper tier contains thirty-six arches, each having a span of 15 feet 9 inches, and is 11 feet 9 inches wide on top. The aqueduct channel is about 4 feet 9 inches deep and 4 feet wide. At the beginning of the fifth century the ends were destroyed by barbarians. In 1743 the bridge was repaired, and the lower tier widened to carry a highway. The maximum height of the bridge above the river Gardon, which it crosses, is 160 feet.

Emperor Augustus constructed a beautiful stone bridge over the river Marecchia, at Rimini, Italy (Fig. 3). It consists of five semi-circular arches having a span of 23 feet. This bridge is in use at the present day, and from all appearances has required but few repairs.

The most magnificent bridge built by the Romans was constructed in the reign of Augustus near Narni, Italy. It consisted of four arches having spans of 75, 135, 114 and 142 feet respectively.

About 104 A. D., during the reign of Trajan, the aqueduct bridge at Segovia, Spain, was built. The bridge contains 109 arches in two tiers. Thirty of the arches are modern, but similar to the old ones. The length of the bridge is over 2,500 feet. The three center arches are 102 feet high. The entire structure is built of squared granite blocks, without mortar. During this same period Trajan constructed a fine stone bridge over the Tagus river at Alcantara, Spain (Fig. 4). There were six semi-circular arches of various spans, the maximum being about 100 feet. The total length of the bridge was 670 feet, and the maximum height above the river was 210 feet. The material was granite, laid without mortar. The bridge was in use until 1809, when the English destroyed the second arch on the right bank of the river. This was temporarily repaired, but again destroyed in 1836, since when no repairs have been made, the natives using a ferry-boat to cross the stream.

In 135 A. D., during the reign of Hadrian, the bridge now called St. Angelo was built at Rome (Fig. 5). It consists of four circular arches the span of the largest being 62 feet 4 inches. This structure is supposed to have been covered with a roof of bronze, supported by forty-two columns. It was repaired by Popes Nicholas III. and Clement IX.

The present balustrade, statues, etc., are, of course, recent, but the arches are old. In nearly all of the Roman bridges the arch was semi-circular in form, and although the segmental and pointed forms may have been known they were never employed in the construction of bridges. The spans of the arches were usually small in comparison with a few of our modern structures, yet they successfully built bridges with spans of 142 feet,

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This bridge, which was composed of eighteen or twenty-one arches, was begun in 1176 and completed in 1188. In 1385 Pope Boniface IX. destroyed some of the arches. In 1410 the inhabitants blew up a tower, causing the fall of three spans. In 1670 the cold was so severe that the Rhone for several weeks bore the heaviest carriages; when the thaw followed the ice destroyed the piers; but the third pier, with the chapel of St. Nicholas, has remained, notwithstanding these many accidents. The span of the largest arch was about 102.9 feet, and was semi-circular. (Authorities differ here, some claiming that the arch had a span of 110 feet and was segmental. The Encyclopedia Britannica states that the arches were elliptical, the minimum radius of curvature being at the crown).

In 1176, or practically at the time when the bridge at Avignon was commenced, Peter of Colchester, a priest, began the erection of the old London bridge across the Thames, but the structure was not completed until 1209. The bridge originally contained nineteen pointed arches having spans from 9 to 20 feet, and piers 25 to 34 feet thick.

For many years there were houses along each side, but these were removed in 1758, and the middle pier and two arches replaced by a single arch of 72 feet span. In 1824–31 the new London bridge replaced this structure.

In 1203 the bridge St. Martin was built over the Tagus river at Toledo, Spain. It consists of five arches, the center arch being the largest, with a span of 132 feet. This arch is very slightly pointed.

In 1281 the Brig O'Balgownie was built over the river Don on the road leading from the old to the new town of Aberdeen, Scotland (Fig. 7). This bridge contains but one arch, which is pointed, and has a span of 66 feet.

These bridges with pointed arches, constructed in different countries, place the introduction of such arches in bridge building at about the thirteenth century.

The old Charles bridge over the Moldau, Prague, Austria, was built between 1357 and 1507 (Fig. 8). It consisted of sixteen spans, the largest being 69.5 feet. In a photograph the arches appear to be semi-circular. The structure was ornamented with thirty statues and groups of saints, one of which is a bronze statue of St. John Nepomac, patron saint of Bohemia (in whose memory the bridge is visited yearly by thousands of pilgrims). The saint is said to have been flung from the bridge in 1383 by order of the Emperor for refusing to betray the confessions of the Empress. The body is said to have floated for some time with five brilliant stars hovering over the head. The bridge was partially destroyed by a flood in 1890.

In 1380 a very large arch was built over the Adda river near Trezzo, Italy, by order of Visconti, but was destroyed by Carmagnola in 1416. From the ruins which remained in 1838 (about twenty feet at each abut-

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ment) the span has been determined to have been about 251 feet and the rise about 88 feet. The arch ring was remarkable as being in two concentric rings with a total thickness of but four feet.

The Vecchio bridge at Florence, Italy (Fig. 9), over the Arno river, was first built in 1177, but was rebuilt in 1345. It consists of three arches of 96 feet span and 19.2 feet rise, the curves being segments of a circle and in appearance quite flat. The width of the structure is 105 feet, and along the sides are built stores, etc.

Adjacent to the Vecchio bridge the Trinity bridge was erected in 1566. It consists of three elliptical arches, the largest having a span of 95.8 feet and a rise of 16 feet.

The Rialto at Venice, Italy, built of marble in 1588–91, has but one span of 98.5 feet, with a rise of 23 feet (Fig. 10).

Apparently, in imitation of the Rialto, the Fleisch-brücke in Nuremburg was constructed in 1599, with a span of 97 feet and a rise of 13 feet (Fig. 11).

These examples of the segmental, or elliptical, arch mark the advent of flat arches, though, of course, the form was not universally employed, as Pont Neuf, over the Seine river, Paris, France (Fig. 12), built between 1578 and 1604, consists of a large number of semi-circular arches with a maximum span of 51.1 feet and a rise of 21.9 feet.

In 1553–1570 the Tempoala aqueduct, seven miles south of Huauchinango, Mexico, was constructed under the direction of a Franciscan friar. It contains sixty-eight semi-circular arches, the largest having a span of 58 feet. Its maximum height is 124 feet. It is built on two tangents 177 degrees apart. The waterway is only 8½ inches by 12 inches.

During the eighteenth century many fine bridges were built. Of these only a few can be mentioned. Near Lisbon, Spain, the Alcantara aqueduct was commenced in 1731 and completed about 1774. It contains thirty-five pointed arches, the largest arch having a span of 100 feet and a rise of 88 feet. The height of the intrados of the maximum arch is 197 feet, while the maximum height of the bridge is 230 feet.

It is claimed that this is the highest masonry arch bridge, having but one tier of arches, in the world.

Pont-de-la-Concorde (built 1787) at Paris, France, has five segmental arches, the center span being 102.3 feet with a rise of 9.8 feet.

The Kelso bridge over the Tweed river, Kelso, Scotland (Fig. 13), was built 1799–1803. It has five elliptical arches with a maximum span of 73 feet and a rise of 21 feet.

In 1809 the Dunkeld bridge over the Tay river, at Dunkeld, Scotland, was completed (Fig. 14). There are seven arches, the center span being 90 feet with a rise of 30 feet.

Between 1813 and 1822 a fine bridge over the Garonne river, at Bor-

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deaux, France, was built. There are seventeen elliptical arches, having spans varying from 65.86 feet to 86.92 feet. The maximum span has a rise or 28.9 feet.

The new Waterloo bridge, London, was opened in 1817 (Fig. 15). There are nine elliptical arches, with a span of 120 feet and a rise of 34.6 feet.

The new London bridge was built between 1821 and 1830. (Fig. 16.) The five elliptical arches have spans varying from 130 feet to 152 feet. The rise of the maximum span is 29.6 feet above high water.

The Bromielaw bridge in Glasgow, Scotland (Fig. 17), has seven segmental arches, the largest having a span of 58.5 feet with a rise of 10.8 feet. It was constructed in 1833–36.

In 1841–47 the highest stone bridge in the world was constructed on the canal leading to Marseilles, France, where it crosses the Arc Valley. The bridge has three tiers of arches. The lowest tier has twelve arches of 49.2 feet span; the middle tier fifteen arches of 52.5 feet, and the upper tier fifty-three arches of 16.4 feet span.

The bridge is 48 feet wide on top, 1,289 feet long and 271 feet high. The width of the canal on the bottom is about 22 feet.

Up to 1847 nothing of any magnitude, in the way of stone bridges, had been erected in the United States. During this year the Starrucca viaduct, carrying two tracks of the New York, Lake Erie and Western Railway over Starrucca creek, near Lanesborough, Pa., was constructed. There are seven segmental arches of 51 feet span, and the maximum height of the rails above water is 110 feet.

In 1852–59 the Cabin John bridge, the largest stone arch in the world, was built; near Washington, D. C., to carry an aqueduct and highway over Rock creek. Its span is 220 feet, with a rise of 57.3 feet.

The Waldi-tobel* bridge, in the western part of Austria, was built in 1884 (Fig. 18). Its span is 134.5 feet, with a rise of 42.16 feet, while the rails are about 160 feet above the bottom of the gorge which it crosses.

In 1884 a highway bridge, with a span of 150 feet and a rise of 27 feet, was built at Elyria, Ohio (Fig. 19).

In 1892, at Wheeling, W. Va., an arch with a span of 159 feet and a rise of 28.4 feet was constructed (Fig. 20).

In same year (1892) the Jarenze* bridge, the largest arch bridge in the world for railway purposes, was built in the eastern part of Austria over the river Pruth (Fig. 21). The span is 213 feet, and the rise 59 feet.

The Cresheim bridge, in Fairmount Park, Philadelphia, Pa., built in 1892, has a span of 116 feet, with a rise of 21.1 feet (Fig. 22). This bridge carries a sewer over a small stream.

*This bridge was designed by Mr. Ludwig Huss, Chief Engineer of the Austrian State Railways, to whom the author is indebted for the photograph.

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DOES SAWING CONSTITUTE A PART OF THE DRESSING?

A VERY knotty question was submitted for adjustment to the St. Louis Board of Public Improvements recently. It involves the validity of an ordinance passed last April providing that all stone used in city work shall be dressed within the territorial limits of the State of Missouri. The law is strictly a union labor enactment, and if the board is compelled to have its validity tested such action will undoubtedly cause a united howl on the part of union labor organizations in the city. As the board will have to do something in the matter, it is placed in a very delicate position.

The question was opened by a communication submitted by E. J. Stamm and S. M. Lederer, local stone dealers. They cited the ordinance mentioned and then stated that a large quantity of stone was being shipped here from another state for use on city contracts, and that it was sawed before it reached St. Louis. They contended that the sawing constituted to a large degree all the dressing necessary. In conclusion they asked the opinion of the board on the matter.

The board resolved itself into committee of the whole and discussed the question at length, but failed to arrive at any definite conclusion. Messrs. Stamm and Lederer endeavored to demonstrate that sawing was the biggest part of dressing stone. The board finally arose and reported progress. The stone dealers will insist on a decision in the matter.

The stone which the dealers have reference to in their communication is the gray granite from Georgia used for curbing. It is sawed at the quarry and with a little trimming up is ready for use. This granite costs the property holders about $1 per foot. If the same granite were shipped to St. Louis in the rough and dressed it would cost, probably, $1.25 per foot. Thousands of feet of this Georgia granite are used there annually in steel construction. In case it should be decided that it is a violation of the ordinance to ship the granite already sawed the property owners will have to pay the difference in cost, to say nothing of the increased freight charges that would accrue by shipping the stone rough.

The local stone dealers are very anxious that the granite shall be sent in the rough. In that event they would get the contracts for dressing it and would reap a considerable income from that source. If the board decides that sawing is not a part of the dressing, then the matter will be disposed of. On the other hand, if the opposite conclusion is reached, the board will either have to order the granite in the rough or attack the validity of the ordinance. The private opinion of some of the members is that the Municipal Assembly has no authority to enact such a law, and that it conflicts with the constitution. [Up to April 4 the board had come to no decision.—Editor STONE.]

"We think every man interested in the stone trade should take STONE."—*E. A. Grove & Sons, La Valle, Wis.*

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A NOVEL MEANS OF ADVERTISING GRANITE





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the Booth Bros. & Hurricane Isle Granite Co., whose general offices are at No. 207 Broadway, New York City.

In a booklet recently issued by this company these illustrations, with others, are included. From the text of this booklet we quote:

"A glance at modern architecture brings the following facts to mind, viz.: Granite is more extensively used at the present time as a building material, and why not? Its durability is unquestioned; its availability is being constantly proved, especially where ornamentation is the principal feature; finally, and perhaps the most effective argument, the cost is not relatively higher than very much inferior material, as bids on recent contracts have shown. Here are important points for building commissions and business men to consider before making decisions.



GUIDET MONUMENT.
Connecticut White Granite.

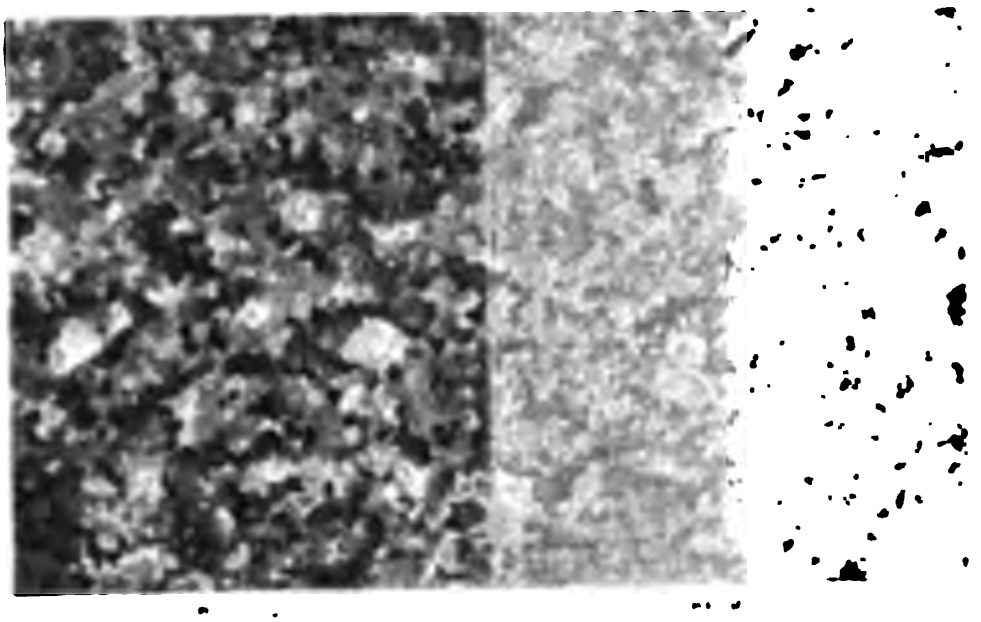
"The most important commercial buildings are owned by banks and insurance companies, and the solid appearance of these buildings impress the mind with the stability of the house carrying on business within its walls, and is the best method for advertising that can be secured.

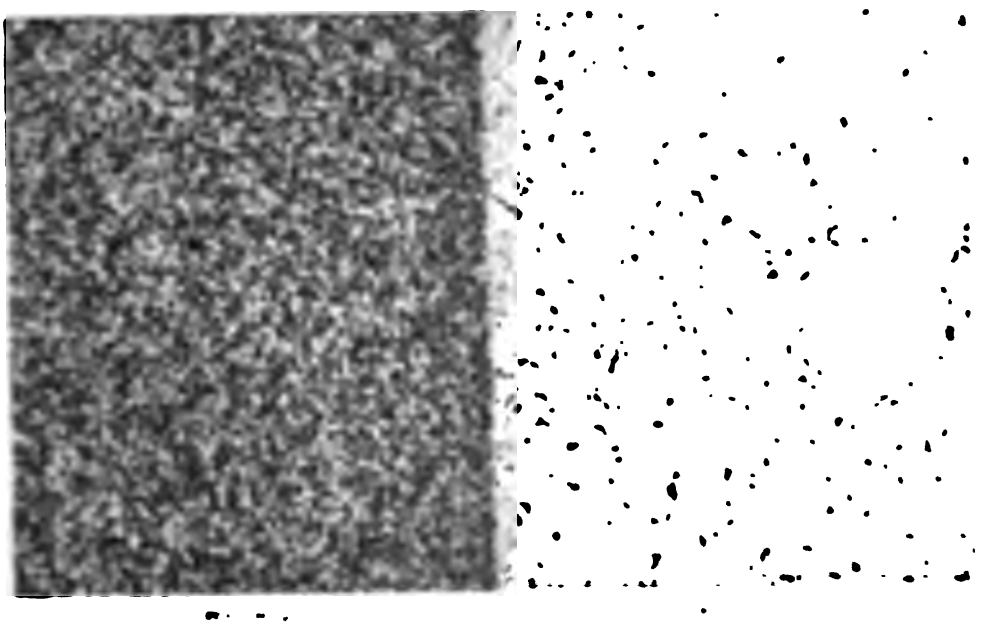
"The cost of working granite was, up to the present day, exorbitant, but the advanced development of industrial resources, by the introduction of improved machinery, has made this refractory material subservient for use.

"In the early ages when labor counted for nothing granite was wisely selected for tombs of Egyptian kings. Their statues and temples, although thousands of years old, are to this day in an almost perfect state of preservation. Granite for a long time has been preëminent as a material for the construction of memorials in our cemeteries. It is possible to reproduce with artistic accuracy models of statuary, or any form of carving, with that delicacy of outline similar to marble, but possessing more durable qualities and at a less cost than bronze.

"Hence the important growth in the use of granite statuary and also of

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This bridge, which was composed of eighteen or twenty-one arches, was begun in 1176 and completed in 1188. In 1385 Pope Boniface IX. destroyed some of the arches. In 1410 the inhabitants blew up a tower, causing the fall of three spans. In 1670 the cold was so severe that the Rhone for several weeks bore the heaviest carriages; when the thaw followed the ice destroyed the piers; but the third pier, with the chapel of St. Nicholas, has remained, notwithstanding these many accidents. The span of the largest arch was about 102.9 feet, and was semi-circular. (Authorities differ here, some claiming that the arch had a span of 110 feet and was segmental. The Encyclopedia Britannica states that the arches were elliptical, the minimum radius of curvature being at the crown).

In 1176, or practically at the time when the bridge at Avignon was commenced, Peter of Colchester, a priest, began the erection of the old London bridge across the Thames, but the structure was not completed until 1209. The bridge originally contained nineteen pointed arches having spans from 9 to 20 feet, and piers 25 to 34 feet thick.

For many years there were houses along each side, but these were removed in 1758, and the middle pier and two arches replaced by a single arch of 72 feet span. In 1824–31 the new London bridge replaced this structure.

In 1203 the bridge St. Martin was built over the Tagus river at Toledo, Spain. It consists of five arches, the center arch being the largest, with a span of 132 feet. This arch is very slightly pointed.

In 1281 the Brig O'Balgownie was built over the river Don on the road leading from the old to the new town of Aberdeen, Scotland (Fig. 7). This bridge contains but one arch, which is pointed, and has a span of 66 feet.

These bridges with pointed arches, constructed in different countries, place the introduction of such arches in bridge building at about the thirteenth century.

The old Charles bridge over the Moldau, Prague, Austria, was built between 1357 and 1507 (Fig. 8). It consisted of sixteen spans, the largest being 69.5 feet. In a photograph the arches appear to be semi-circular. The structure was ornamented with thirty statues and groups of saints, one of which is a bronze statue of St. John Nepomac, patron saint of Bohemia (in whose memory the bridge is visited yearly by thousands of pilgrims). The saint is said to have been flung from the bridge in 1383 by order of the Emperor for refusing to betray the confessions of the Empress. The body is said to have floated for some time with five brilliant stars hovering over the head. The bridge was partially destroyed by a flood in 1890.

In 1380 a very large arch was built over the Adda river near Trezzo, Italy, by order of Visconti, but was destroyed by Carmagnola in 1416. From the ruins which remained in 1838 (about twenty feet at each abut-

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ment) the span has been determined to have been about 251 feet and the rise about 88 feet. The arch ring was remarkable as being in two concentric rings with a total thickness of but four feet.

The Vecchio bridge at Florence, Italy (Fig. 9), over the Arno river, was first built in 1177, but was rebuilt in 1345. It consists of three arches of 96 feet span and 19.2 feet rise, the curves being segments of a circle and in appearance quite flat. The width of the structure is 105 feet, and along the sides are built stores, etc.

Adjacent to the Vecchio bridge the Trinity bridge was erected in 1566. It consists of three elliptical arches, the largest having a span of 95.8 feet and a rise of 16 feet.

The Rialto at Venice, Italy, built of marble in 1588–91, has but one span of 98.5 feet, with a rise of 23 feet (Fig. 10).

Apparently, in imitation of the Rialto, the Fleisch-brücke in Nuremburg was constructed in 1599, with a span of 97 feet and a rise of 13 feet (Fig. 11).

These examples of the segmental, or elliptical, arch mark the advent of flat arches, though, of course, the form was not universally employed, as Pont Neuf, over the Seine river, Paris, France (Fig. 12), built between 1578 and 1604, consists of a large number of semi-circular arches with a maximum span of 51.1 feet and a rise of 21.9 feet.

In 1553–1570 the Tempoala aqueduct, seven miles south of Huauchinango, Mexico, was constructed under the direction of a Franciscan friar. It contains sixty-eight semi-circular arches, the largest having a span of 58 feet. Its maximum height is 124 feet. It is built on two tangents 177 degrees apart. The waterway is only 8½ inches by 12 inches.

During the eighteenth century many fine bridges were built. Of these only a few can be mentioned. Near Lisbon, Spain, the Alcantara aqueduct was commenced in 1731 and completed about 1774. It contains thirty-five pointed arches, the largest arch having a span of 100 feet and a rise of 88 feet. The height of the intrados of the maximum arch is 197 feet, while the maximum height of the bridge is 230 feet.

It is claimed that this is the highest masonry arch bridge, having but one tier of arches, in the world.

Pont-de-la-Concorde (built 1787) at Paris, France, has five segmental arches, the center span being 102.3 feet with a rise of 9.8 feet.

The Kelso bridge over the Tweed river, Kelso, Scotland (Fig. 13), was built 1799–1803. It has five elliptical arches with a maximum span of 73 feet and a rise of 21 feet.

In 1809 the Dunkeld bridge over the Tay river, at Dunkeld, Scotland, was completed (Fig. 14). There are seven arches, the center span being 90 feet with a rise of 30 feet.

Between 1813 and 1822 a fine bridge over the Garonne river, at Bor-

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deaux, France, was built. There are seventeen elliptical arches, having spans varying from 65.86 feet to 86.92 feet. The maximum span has a rise or 28.9 feet.

The new Waterloo bridge, London, was opened in 1817 (Fig. 15). There are nine elliptical arches, with a span of 120 feet and a rise of 34.6 feet.

The new London bridge was built between 1821 and 1830. (Fig. 16.) The five elliptical arches have spans varying from 130 feet to 152 feet. The rise of the maximum span is 29.6 feet above high water.

The Bromielaw bridge in Glasgow, Scotland (Fig. 17), has seven segmental arches, the largest having a span of 58.5 feet with a rise of 10.8 feet. It was constructed in 1833–36.

In 1841–47 the highest stone bridge in the world was constructed on the canal leading to Marseilles, France, where it crosses the Arc Valley. The bridge has three tiers of arches. The lowest tier has twelve arches of 49.2 feet span; the middle tier fifteen arches of 52.5 feet, and the upper tier fifty-three arches of 16.4 feet span.

The bridge is 48 feet wide on top, 1,289 feet long and 271 feet high. The width of the canal on the bottom is about 22 feet.

Up to 1847 nothing of any magnitude, in the way of stone bridges, had been erected in the United States. During this year the Starrucca viaduct, carrying two tracks of the New York, Lake Erie and Western Railway over Starrucca creek, near Lanesborough, Pa., was constructed. There are seven segmental arches of 51 feet span, and the maximum height of the rails above water is 110 feet.

In 1852–59 the Cabin John bridge, the largest stone arch in the world, was built; near Washington, D. C., to carry an aqueduct and highway over Rock creek. Its span is 220 feet, with a rise of 57.3 feet.

The Waldi-tobel* bridge, in the western part of Austria, was built in 1884 (Fig. 18). Its span is 134.5 feet, with a rise of 42.16 feet, while the rails are about 160 feet above the bottom of the gorge which it crosses.

In 1884 a highway bridge, with a span of 150 feet and a rise of 27 feet, was built at Elyria, Ohio (Fig. 19).

In 1892, at Wheeling, W. Va., an arch with a span of 159 feet and a rise of 28.4 feet was constructed (Fig. 20).

In same year (1892) the Jarenze* bridge, the largest arch bridge in the world for railway purposes, was built in the eastern part of Austria over the river Pruth (Fig. 21). The span is 213 feet, and the rise 59 feet.

The Cresheim bridge, in Fairmount Park, Philadelphia, Pa., built in 1892, has a span of 116 feet, with a rise of 21.1 feet (Fig. 22). This bridge carries a sewer over a small stream.

*This bridge was designed by Mr. Ludwig Huss, Chief Engineer of the Austrian State Railways, to whom the author is indebted for the photograph.

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DOES SAWING CONSTITUTE A PART OF THE DRESSING?

A VERY knotty question was submitted for adjustment to the St. Louis Board of Public Improvements recently. It involves the validity of an ordinance passed last April providing that all stone used in city work shall be dressed within the territorial limits of the State of Missouri. The law is strictly a union labor enactment, and if the board is compelled to have its validity tested such action will undoubtedly cause a united howl on the part of union labor organizations in the city. As the board will have to do something in the matter, it is placed in a very delicate position.

The question was opened by a communication submitted by E. J. Stamm and S. M. Lederer, local stone dealers. They cited the ordinance mentioned and then stated that a large quantity of stone was being shipped here from another state for use on city contracts, and that it was sawed before it reached St. Louis. They contended that the sawing constituted to a large degree all the dressing necessary. In conclusion they asked the opinion of the board on the matter.

The board resolved itself into committee of the whole and discussed the question at length, but failed to arrive at any definite conclusion. Messrs. Stamm and Lederer endeavored to demonstrate that sawing was the biggest part of dressing stone. The board finally arose and reported progress. The stone dealers will insist on a decision in the matter.

The stone which the dealers have reference to in their communication is the gray granite from Georgia used for curbing. It is sawed at the quarry and with a little trimming up is ready for use. This granite costs the property holders about $1 per foot. If the same granite were shipped to St. Louis in the rough and dressed it would cost, probably, $1.25 per foot. Thousands of feet of this Georgia granite are used there annually in steel construction. In case it should be decided that it is a violation of the ordinance to ship the granite already sawed the property owners will have to pay the difference in cost, to say nothing of the increased freight charges that would accrue by shipping the stone rough.

The local stone dealers are very anxious that the granite shall be sent in the rough. In that event they would get the contracts for dressing it and would reap a considerable income from that source. If the board decides that sawing is not a part of the dressing, then the matter will be disposed of. On the other hand, if the opposite conclusion is reached, the board will either have to order the granite in the rough or attack the validity of the ordinance. The private opinion of some of the members is that the Municipal Assembly has no authority to enact such a law, and that it conflicts with the constitution. [Up to April 4 the board had come to no decision.—Editor STONE.]

"We think every man interested in the stone trade should take STONE."—*E. A. Grove & Sons, La Valle, Wis.*

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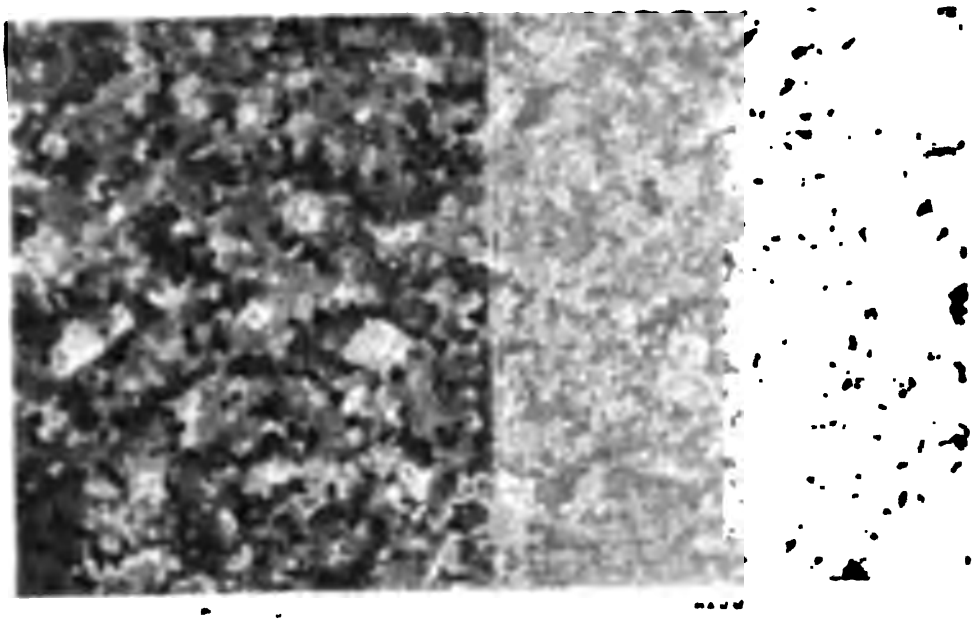
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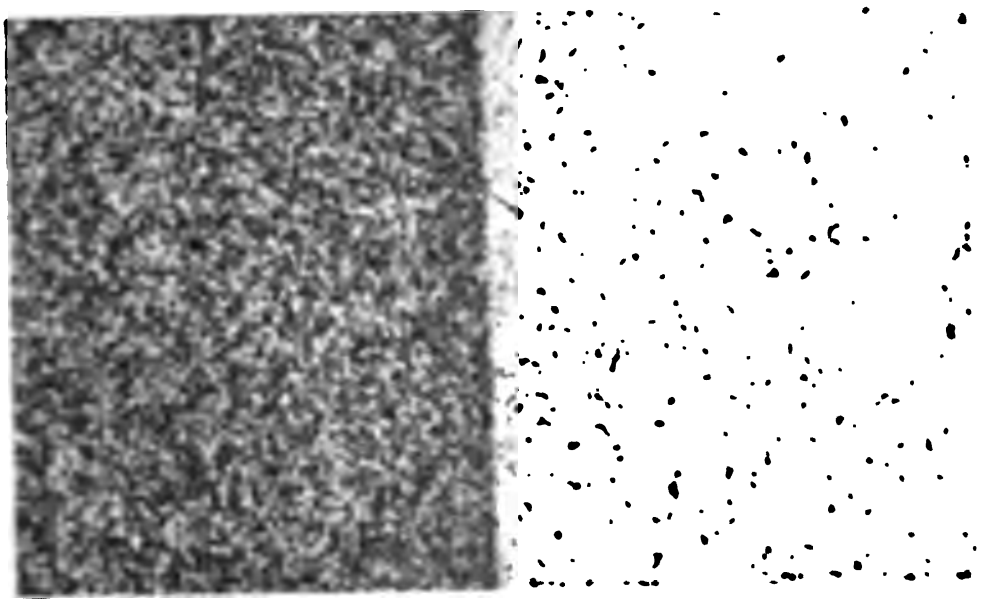
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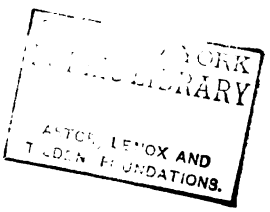
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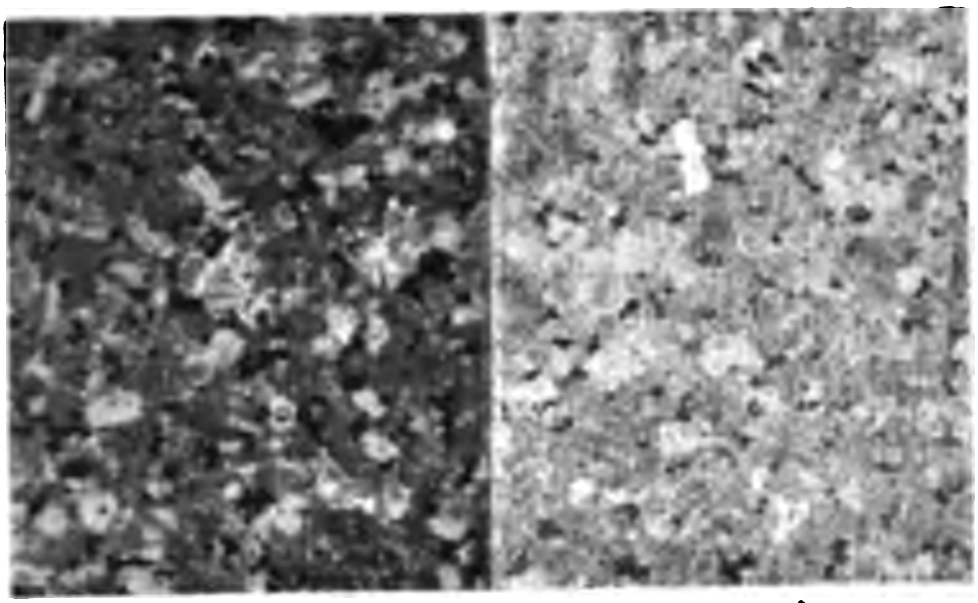


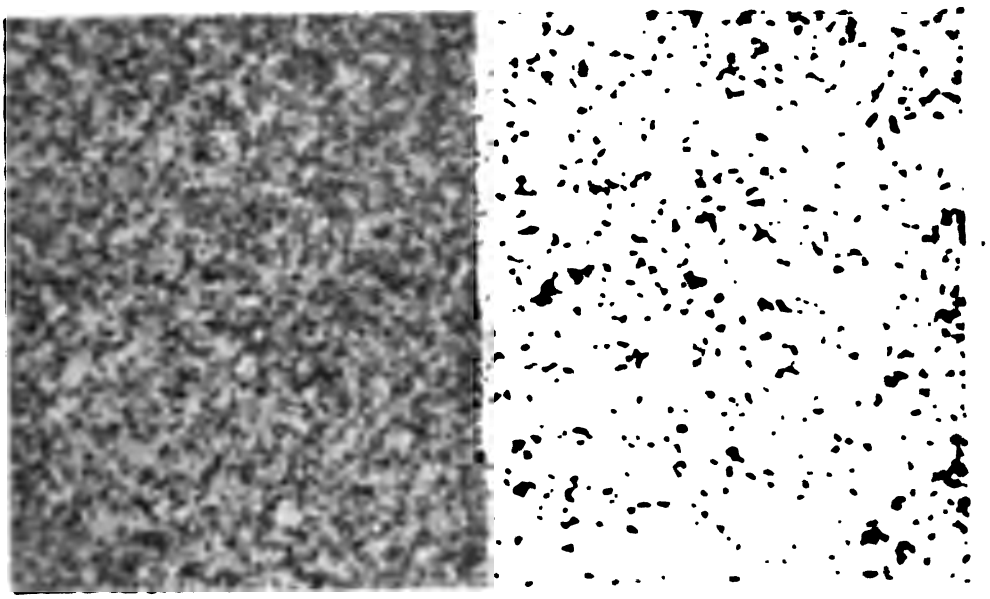


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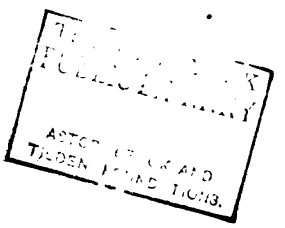


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UTAH COLORED MARBLE.

SAMPLES of [illegible] have been received from [illegible] Mr. [illegible] Salt Lake City, Utah. [illegible]

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In a few instances we would recommend that [illegible]

The [illegible]

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[illegible]	[illegible]

The [illegible] and the [illegible] are [illegible] [illegible] [illegible]

cretions, the formation affords very large masses of comparatively homogeneous material. The supply is practically inexhaustible, while the ready accessibility of the deposit and its proximity to a railroad promises great results from an intelligent working of the formation. I regard it as one of the most valuable stone deposits of this region."

We would be pleased to exhibit the samples to any one interested if they will call at our office.

STONES OF GEORGIA.

"GEORGIA is beyond compare the richest of the states under our flag and the richest region in the world in the quantity, variety and quality of her marbles and building stones," writes F. H. Richardson, of Atlanta. "The greatest marble quarry in the world, the Georgia Marble Co., is within eighty miles of Atlanta—at Tate in the county of Pickens. There are other quarries in that region which produce marbles so perfect that after the most trying tests by the best experts of all that was offered from anywhere, the State of Minnesota had to come to Georgia for the material for her $3,000,000 capitol. Not because Minnesota desired to compliment Georgia, but because she wanted the best she could get for the structure that is to be for generations the home of her state sovereignty.

"And Rhode Island! There's a lesson for you. The richest area of its size on this continent, one of the Old Thirteen, famous for many things, but for few of them more famous than for the quality of her building stones, yet coming to Georgia for the marble out of which her splendid new capitol is to be built, just as Minnesota came, because she wanted the best. They are cutting and shaping the marble for these two great capitols at the Southern Marble Co.'s works, at Marble Hill, in Pickens county. There are a dozen other splendid and costly structures being built in Northern and Western states of Georgia marble.

"The city of Atlanta alone has sent $100,000 to Rhode Island for stone for monuments and memorials, and yet when Rhode Island wants a capitol that she can be proud of she comes to Georgia to get the stuff to make it strong and beauteous and enduring."

"I consider STONE a valuable and interesting magazine, not only to those especially interested in its technical subjects, but to the general reader."—*Winthrop Alexander, architect, Roland Park, Md.*

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THE COFFER DAM PROCESS FOR PIERS—X

THE FOUNDATIONS.



HE coffer dam becomes the means of reaching a desired end and this must be borne in mind and the construction made as economical as possible to obtain a first-class foundation.

When the coffer dam is completed and pumped out work can then proceed if the pumps are able to control the water easily. The character of the foundation having been previously decided upon after a careful examination of the site it is assumed that the temporary work has been constructed in a manner which is properly related to the permanent structure.

The different kinds of bottom likely to be encountered are: First, light sand and gravel or mud of unknown depth over soft, similar material overlying rock or cemented gravel; clay, hardpan or rock; third, a clean rock bottom which is approximately smooth and level; fourth, a sloping rock bottom which is either smooth or rough and with a rough and irregular surface.

Should the bottom be of the first kind—light sand and gravel or mud of unknown depth—the soft upper layer may have been removed by a dredge, previous to the building of the dam, or it may be removed by a dredge or grab, after the dam is closed area, and without the necessity of keeping the dam pumped out or pumping may be kept up with a lifting pump after the light material removed in this way, after which the heavier material may be removed as deep as necessary by hand shoveling and a diver working as engineer. In such a bottom the foundation is usually made by driving piles to hold it level between the distance being regulated by the formula given as determined from Weisbach's formula in Article IV, page 19, using the largest of the piles after they have been driven to a level to resist water pressure. The space between the piles should be filled with broken stone or concrete and the gravel entirely below the water, the coffer dam being kept pumped out to allow the work to be done and also during the laying of the lasting courses of the masonry which are below the water.

When the soft bottom overlays gravel, clay, hardpan or rock as in the second case and the depth exceeds [illegible] feet below the water surface, piles may be driven to the harder substratum and act as bearing piles. But when the depth is in the neighborhood of [illegible] feet or more, it is best to excavate and

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place the foundation masonry directly upon the solid bottom. The foundation will be of the character described for some of the following cases:

The third class is similar to the foundation at Chattanooga after the gravel was removed. The fissures in the rock are filled up or closed with cement and concrete, and a leveling course of concrete put down on which to found the pier. (Fig. 49).



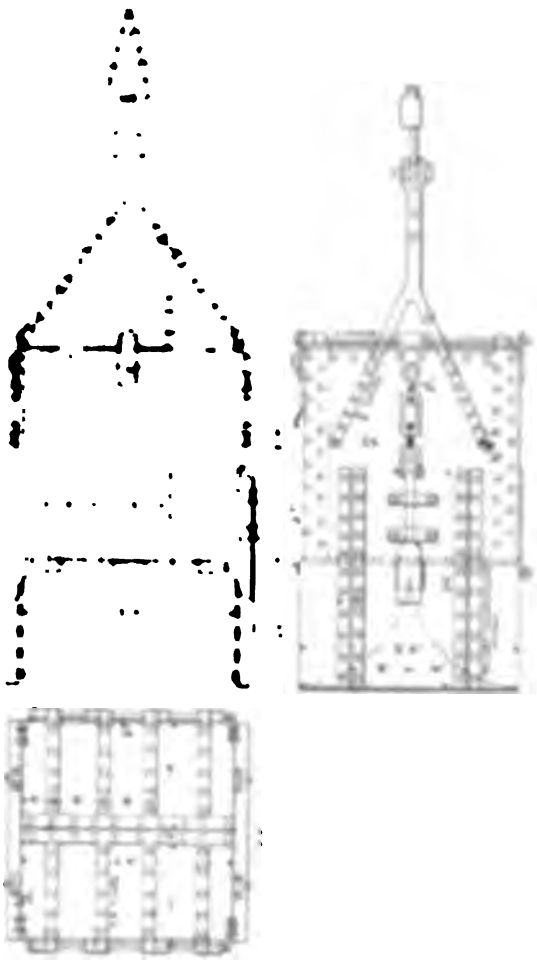
FIG. 85.—METAL TUBE FOR CONCRETING.

Bottoms of the fourth class should have all the loose and decomposed rock removed and steps cut out by blasting and wedging, to give a secure hold for the foundation, but if it is simply rough and irregular a leveling course of concrete will be all that is required on which to start the pier. Bottoms of clay and hard-pan will require a very similar treatment, except that the leveling course of concrete must be made of sufficient thickness to properly distribute the pressure, which will seldom be less than three feet and can often be increased with advantage to six or eight feet. An example of the stepping of rock bottom was given in the account of the Forth Bridge piers in Article VII and was shown by the dotted lines in Fig. 64.

Where there is a current caused by leakage through the sides of a coffer-dam, or from the bottom, or if the water within the dam is agitated by the pumping, it will be best, after the bottom is clean and properly prepared, to allow the water to run in and then deposit the concrete through the still water. This has been successfully accomplished through 25 or 30 feet of water, and while some engineers recommend allowing the concrete to set from one to three hours before depositing, to prevent the cement from washing out of the concrete, this is not necessary nor advisable if the proper care is exercised and the proper apparatus used. The concrete should be made from one-third to one-half richer than would be used for similar open air work, as there will be some loss of strength.

The simplest method is to deposit the concrete in paper sacks by sliding them down a smooth wooden or iron chute, or by loading them into a box or skip and dumping them out after the box reaches the bottom. The sacks should be of tough paper, similar to flour sacks, and when they reach the bottom they may be broken by a pike pole and the concrete allowed to run

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cault bridge over the river Saone in France a wooden tube 16 inches square was used. This is described in the Engineering News of May 18, 1893. The tube was carried transversely across the caisson on a traveling crane which ran lengthwise of the caisson on tracks on the sides, thus allowing the tube to be moved in any desired direction. The tube was built in sections which could be easily removed, was provided with a hopper at the top into which the concrete was dumped, and a drop door at the bottom to let

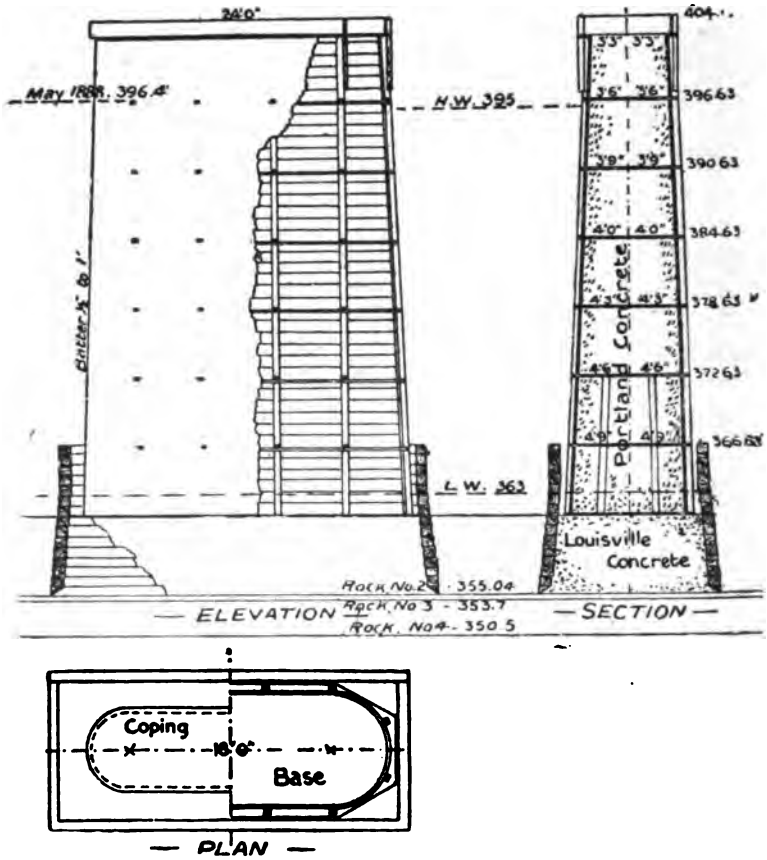


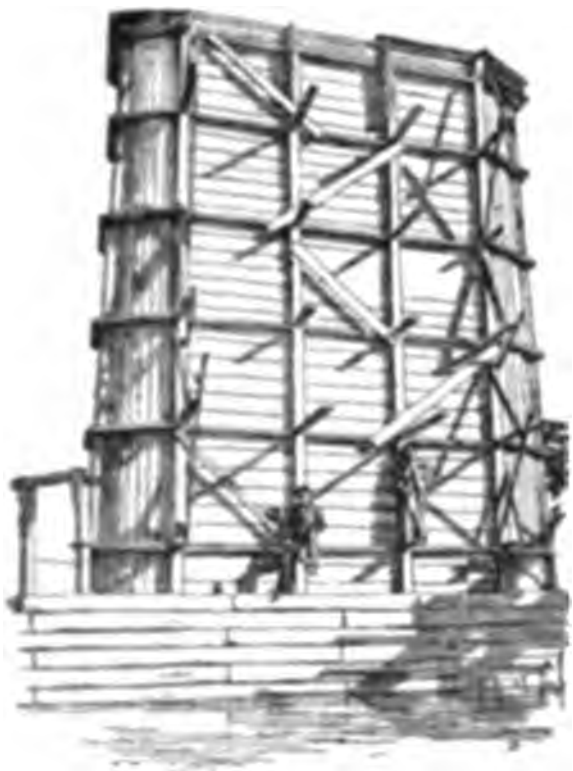
FIG. 87.—CONCRETE PIERS. RED RIVER BRIDGE.

out the concrete. The tube was filled as it was lowered down into the water, and opened when within 16 inches of the bottom. As concrete was dumped in above, the tube was moved about and a 16-inch layer of concrete deposited. When one layer was complete, another of the same thickness was deposited. This method of using 16-inch layers was said to have obviated laitance or the exuding of the gelatinous fluid which prevents uniform

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setting. The concrete was deposited about the heads of the piles and brought up to the required height. The thickness of the concrete which was deposited at the rate of [illegible] cubic yards per day was [illegible] feet and was allowed to set [illegible] hours before the pier was begun.

A [illegible] tube was used such as was employed on the Harvard bridge at Boston by W. H. Ward. This tube, [illegible] was provided with a bottom and the first lining of the tube was [illegible] after the tube was lowered and the concrete became somewhat washed. The [illegible] was prevented by using [illegible] concrete in piers as [illegible] the tube the first time. The tube was suspended from a derrick and was moved about so as to keep the concrete level and to [illegible] position. This account is taken from [illegible] of the Engineering News from which is taken the following description of a metal [illegible] used by W. D. Taylor in the Cleveland river.



The bucket [illegible] was of riveted construction and the [illegible] concrete. The maximum depth of water was [illegible] feet at which depth the bucket and its load became [illegible] at the bucket to just as soon as the flanges [illegible] the bucket [illegible] are [illegible] [illegible] [illegible]

constructed. The pier at Little Rock (Fig. 52) was of this construction and of the composition given in Article VI. A similar piece of work was constructed on the Red River bridge on the St. Louis & San Francisco Railway and is described in the Engineering News of June 2, 1888, by C. D. Purdon, assistant engineer in charge of the work, under James Dun, Chief Engineer. The cribs were filled with Louisville cement concrete up to within two feet of low water, on which was built the pier. (Figs. 87 and 88.)

"After the crib had been filled with concrete and the surface leveled off, the center lines of the pier were located and a frame of 2″x8″ plank the shape of the pier, and four inches larger to allow for lagging, was placed in exact position and held by pieces spiked to the crib. On this frame upright posts 6″x6″ and 5′ 10″ high, with a batter of one-half inch per three feet were set in the position shown on the drawing, then the feet spiked to the frame and another frame similar to the first, but six inches narrower placed on them. This again was brought to exact position and braced to the crib

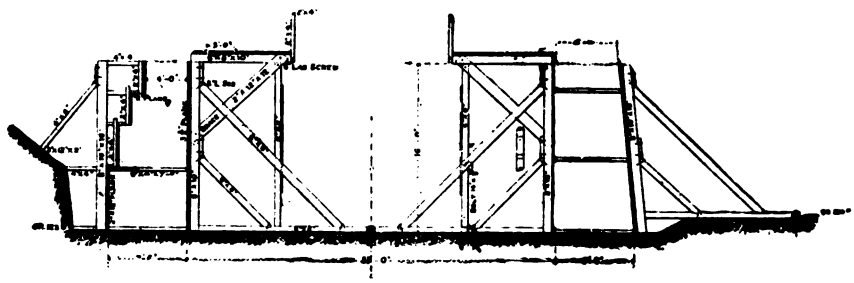
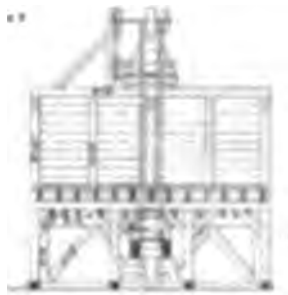


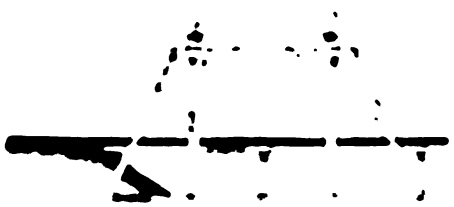
FIG. 89.—CONCRETE FORMS. ILLINOIS AND MICHIGAN CANAL.

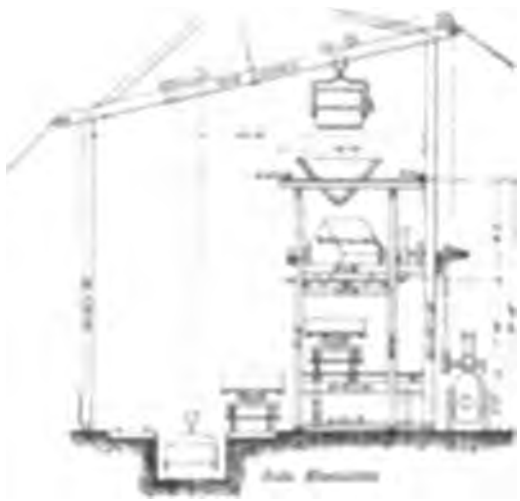
and the frame completed by putting lagging of 2-inch plank inside the posts and spiking to them. This lagging was horizontal in the body of the pier and vertical (2″x4″) at the ends, beveled pieces being introduced in the ends at intervals to make up the difference of the upper and lower circles. Next 2″x6″ planks were placed across on the top of the posts, running clear through the pier, to act as braces. In the rest of the frames these braces were allowed to extend about six feet on each side and the frame braced by spiking plank to them and to the vertical posts. After a section of frames was completed a bed of cement mortar about two inches thick was spread all over the concrete in the crib. On this the rough stone, in such pieces as one man could easily handle, was placed so that no two pieces would be closer than two inches, nor any piece within two inches of the frame, the stone being thoroughly wet before laying.

"Next, on this course of stone another bed of mortar was placed, sufficient to fill all the spaces between the stones and remain about two inches thick above them. It was then well rammed with rammers made by inserting a

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loose portions had been scraped off. This was mainly done for appearance."

The mortar for the body of the pier was made of one part Alsen's German Portland cement and four parts of sand. There was used about 1⅓ barrels of cement to a cubic yard of completed pier. In mixing the mortar eleven ordinary pails full of water were used to one barrel of cement, which caused the water to just appear on the surface when the tamping was done.

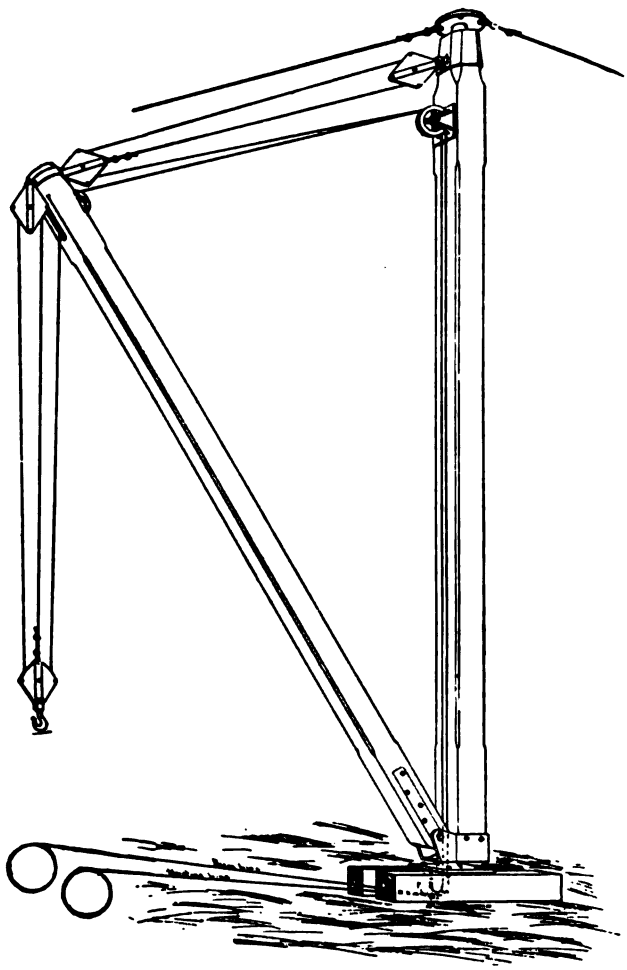


FIG. 91.—AMERICAN HOIST AND DERRICK CO. DOUBLE DRUM GUY DERRICK.

The lock walls on the Illinois and Mississippi canal have been constructed of monolithic concrete under Captain W. L. Marshall, Corps of Engineers. The work was executed under L. L. Wheeler, engineer in charge, from whose account in the report of the Chief of Engineers for 1894, the following is taken:

"The rules adopted for the work were adhered to and are worthy of careful study.

"I. The forms or molds of the walls will be divided by vertical partitions perpendicular to the longest axis of the mass, and the walls be constructed by filling alternate sections.

"II. The sections will be filled in horizontal layers, well rammed, each layer to be deposited before the 'initial set' of the previously deposited layer. When the work of filling a section is begun it must proceed without intermission to completion, working night and day if necessary.

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III The facing and backing must go on simultaneously in the same horizontal layers, using the same cement in the facing as in the backing, with no defined line of demarcation between the facing which contains no stone and the concrete backing

IV When the top surface of the coping is reached it will be finished after ramming by cutting off the excess by a straight edge and trowel smooth and hard by a float No plastering or wet finishing coat will be allowed



[illegible]

V The facing of the walls must be finished by plastering or washing with cement after the forms are removed no dressed in any manner beyond cutting away rough projections and the plane forming marks

VI The concrete shall be mixed with as little water as will make it quake when ramming

VII At such intervals as may be necessary vertical grooves at least [illegible] wide shall be formed along the ends of the masses of concrete backing to receive bonding timbers The masses of concrete after backing will be kept clear of the upper surface of the coping and the whole height filled with water until work is about three weeks old when they shall be filled with cement



[illegible]

VIII In preparing the cement for mixing with other ingredients it must be [illegible] to ten barrels will be kept [illegible] and used during April August and September of the cement and [illegible] the necessary quantity of cement will be [illegible] each batch is mixed

IX Measurements of different quantities shall be used in the same work but as far as practicable each measure shall be given with sufficient cement in the backing to [illegible] to a stiff mortar

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The rate at which the concrete was deposited in the work was determined by the rate of ramming, and but one yard every five minutes was deposited. The forms (Fig. 89) were lined with dressed pine plank 4 by 8 inches on the face, of uniform thickness, and with 2-inch rough plank on the back.

Rough plank is sometimes used on such work and lined with oiled paper, or ordinary dressed plank may be used and coated with soft soap. In most sections of the country crushed broken stone can be obtained, but owing to the magnitude of this work a crusher was built (Fig. 90) and was found to work very satisfactorily. The concrete mixer shown in Fig. 90 was operated by a 15-horse power portable engine. The proportions finally adopted for the concrete were one of cement, three and one-third of gravel, and four

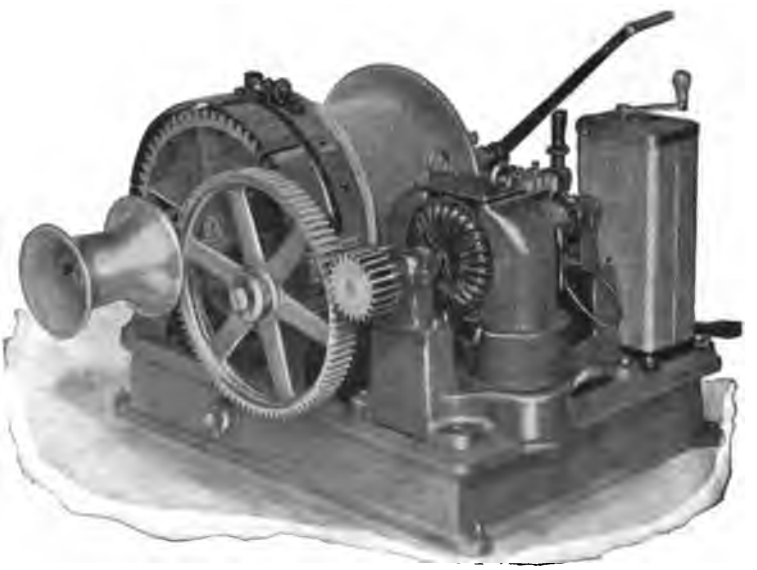


FIG. 94.—CROCKER-WHEELER ELECTRIC HOIST.

of broken stone, while the facing and coping were composed of one part cement and two parts of clean river sand.

That the sand for concrete be clean and sharp is very essential, and any loam or dirt must be washed out. Equally essential is good, clean, sharp, broken stone without dust or dirt. The cement used on the above work was a German Portland, but several of the American Portlands are first-class and will give as good results as the imported.

Where good, fresh cement is being supplied, a few tests to a carload will be sufficient, and for cements of the grade of Atlas or Empire, the guarantee of the manufacturer, supplemented by a few tests, should be sufficient. But

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[illegible] have been objected to water tests should be made to [illegible]

[illegible] Company recommend, for concrete laid in open air [illegible] where great weight must be carried, one of cement two [illegible] sand and four of broken stone; the sand and cement to be [illegible] and then just enough water added to the [illegible] and the mass turned over at least two, when the stone to be



[illegible]

added in a thoroughly wet condition. This must then be put at once into the moulds and well rammed.

Where a solid bottom is to be laid upon the ground, one part of cement three of sand and six of broken stone are recommended. But cheaper concrete is one of cement four of sand and eight of broken stone, which is to obtain a concrete as strong as good many natural cements. A concrete made of cement five of sand and ten of broken stone can be used

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The average cost of such concretes, including labor, tools, timber forms and a fair profit to the contractor would be for the first $8 per yard, for the second $7, for the third $6, and for the fourth $5.

Where the leveling course of concrete has been put in and the pier is to be of stone, the footing course should be of carefully selected material. They should be large stones with good beds, and should be as thick or preferably thicker than the courses above. Where the bearing pressure does not exceed two tons per square foot, the footing courses may be stepped by allowing each course to project about one and one-third times its thickness, depending of course on the quality of the stone.

The usual way of handling the material for foundations and piers, is to boat it to the site, where it is placed by a stiff-leg derrick, or if guys can be used, by a derrick with wire rope guys. The fittings for such derricks can be obtained from a number of firms, an American Hoist and Derrick Company outfit being shown in Fig. 91. This is rigged to be operated by a double drum hoist, which can be one operated by horse power (Fig. 92) if the piers are near the bank and if steam power is not available. The usual form, however, is a double drum steam hoist like the Lidgerwood machine shown in Fig. 93. Where electric power is available an electric hoist (Fig. 94) should be used, as it will be found much more convenient.

Works of any magnitude should, however, be fitted from the beginning with a cableway, which will avoid the necessity of boating the materials, erecting of large derricks, and facilitate in every way the prosecution of the work, besides often making a balance on the right side of the ledger. The Lidgerwood cableway on Dam No. 11 of the Great Kanawah river, a tower of which can be seen in Fig. 9, had a span of 1,505.5 feet and carried a net load of four tons on a main cable 2½ inches in diameter. The stone quarry was located on one bank and the stone was taken directly to the stone yard and to the work in the river. A seam of coal in the quarry also supplied fuel for the dredges and pumps, the coal being handled by the cableway, as was also the material from the railroad siding on the opposite bank.

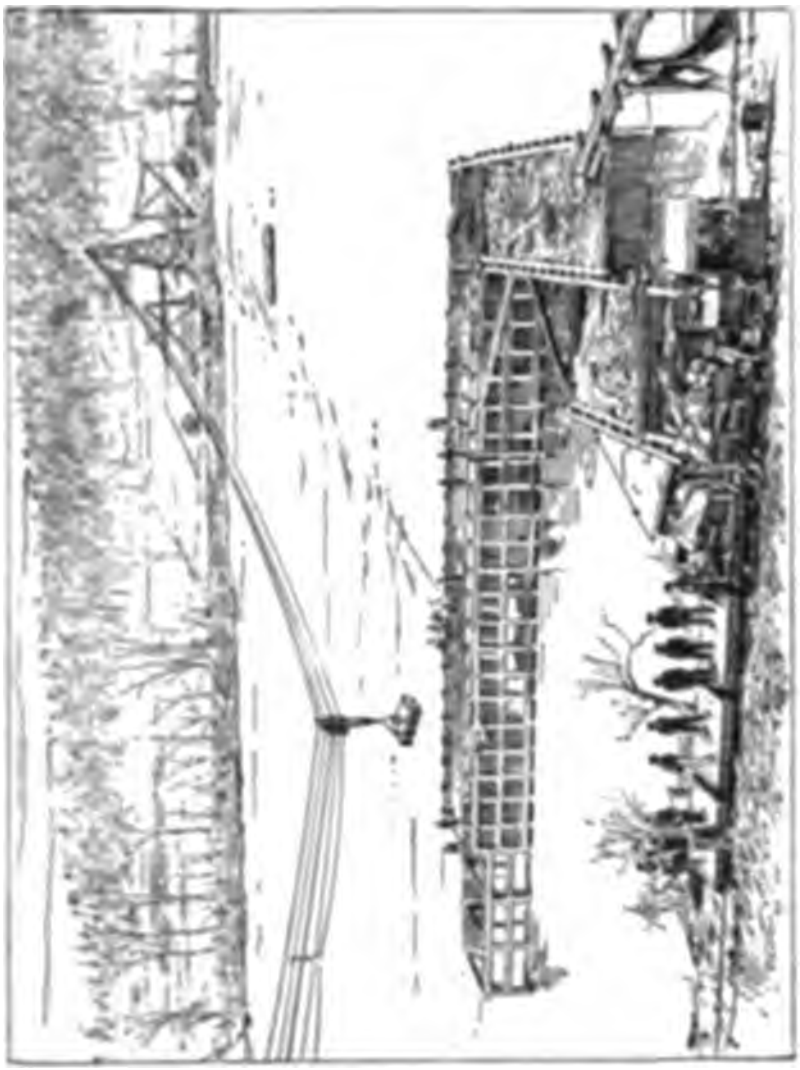
The details of these cableways have been developed and perfected to a wonderful extent, as a result of their use on the Chicago Drainage channel. The engine for operating one of these with a capacity of eight tons has double 10x12 cylinders, the cranks being set at an angle of 90 degrees and is provided with reversing link motion. The double drums regulate both the hoist at a speed of 300 feet per minute and the travel along the cable at 1,000 feet per minute. A 70-horse power boiler is required.

The carriage and skip, which are automatic in action, are shown in Fig. 95, the capacity of those on the Drainage channel being 1.8 yards, and the average of a month being about 600 yards per day of ten hours. The cost of operation, including labor, fuel and everything except interest on plant

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[illegible] was less than $.[illegible] per day or [illegible] three to four cents per yard.

The [illegible] on the [illegible] dam and [illegible] has a capacity of [illegible] and is under [illegible] an average of [illegible] three [illegible]



[illegible] is [illegible] reached [illegible] water and [illegible] [illegible] [illegible] at the North avenue bridge [illegible]

The Court street [illegible] bridge at Rochester, N. Y., [illegible] was constructed with the [illegible] roadway, which was also used [illegible]

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the old bridge and piers. A cableway of one span was used to construct the Melan concrete arch bridge at Topeka, Kan. The bridge has five spans and a total length of 650 feet. During the extreme high water in the early part of 1897, when everything was completely inundated, and an ordinary derrick plant would have been swept away, the cableway was high and dry out of reach of the flood.

The prevailing low prices of contract work make it necessary to employ every improvement on important engineering work, and the cableway has doubtless come to stay as one of the most remarkable of our tools.

Charles Evan Fowler.
Asso. M. Am. Soc. C. E.

[TO BE CONTINUED.]

BLACK HILLS STONE QUARRIES.

THE present season will see a greater amount of building stone quarried from the Black Hills. There was a marked increase during the past year. The permanent quarries, which are located on the trunk railroads, are at Edgemont, Hot Springs, Buffalo Gap, Elk Creek, Boulder Park, Sturgis and Whitewood. The Hot Springs and Buffalo Gap quarries shipped last year 150,000 cubic feet of building stone of superior grade valued at $75,000. The Elk Creek, Sturgis, Boulder Park and Whitewood quarries produced 200,000 cubic feet, valued at $100,000, or 50 cents per cubic foot. There is no reason why the Black Hills quarries, with the same spirit of enterprise that is shown in mining matters, could not produce 50,000,000 cubic feet of building stone annually. Every kind of builder's stone is found in practically inexhaustible quantities and by practical tests the absorption of moisture is found to be less than in the best stone of Wisconsin. The grindstone company of Edgemont during the past two years has shipped several thousand tons of stone to New York, where it comes into competition with imported stone.

"We enjoy your magazine very much and find a great deal of valuable information much needed by us. In fact, we cannot get along comfortably without STONE."—*Beaver Stone Company, Eureka Springs, Ark.*

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CALIFORNIA MARBLES

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amount (less than one per cent.) of silicate minerals, chiefly white tourmaline with a little mica; no iron pyrites, or other minerals that would stain it on exposure."

STONE FROM INYO, INYO COUNTY.

The specimens were pure white dolomite marble in the form of cubes, two inches on an edge. A single sheet of drawing paper was placed between the steel surfaces of the machine and the marble cube.

All of the cubes broke suddenly with a loud report, developing the pyramidal fracture.

Data of the tests as follows:

	Dimensions.	Area.	Breaking Load.	Unit Stress.
No. 1	2.000″x2.000″	4.0000	122,000 lbs.	30,500 lbs. to sq. in.
No. 2	2.012″x2.021″	4.0663	116,160 lbs.	28,570 lbs. to sq. in.
No. 3	2.011″x2.020″	4.0622	111,340 lbs.	27 410 lbs. to sq. in.

BUILDING STONE FROM SANTA MARIA, SANTA BARBARA COUNTY.

Compression Test.

The specimens tested in compression were ground to rectangular form, and then a thin layer of plaster of paris was placed upon the surfaces to which the pressure was applied in order to insure an even bearing; thus distributing the applied load evenly over the entire area.

No. 1 and No. 2, tested February 11, 1898, were dry, i. e., as they came to us. No. 3 and No. 4, tested February 15, 1898, were soaked one week in water before testing. They were the blocks used in the absorption test.

	No. 1.	No. 2.	No. 3.	No. 4.
Length	4.91 in.	5.17 in.	3.17 in.	3.16 in.
Breadth	3.95 in.	3.05 in.	3.15 in.	3.00 in.
Height	3.78 in.	3.43 in.	3.12 in.	2.85 in.
Breaking area	19.40 in.	15.77 in.	9.98 in.	9.48 in.
Breaking load	130,080 lbs.	65,760 lbs.	26,740 lbs.	27,050 lbs
Strength per sq. in	6,700 lbs.	4,170 lbs.	2,680 lbs.	2,850 lbs

Absorption Test.

The absorption test was made for one week. The blocks were dried thoroughly in an oven at about 125° C. before soaking.

	No 3.	No 4.
Weight before drying	828.8 grams.	728.3 grams.
Per cent. of water before drying	6.95 per cent.	6.69 per cent.
Weight dry, i. e., 0. per cent. water	774.9 grams.	682.6 grams.
Weight after 24 hours' immersion	984.7 grams.	873.7 grams.
Per cent. water after 24 hours' immersion	27.07 per cent.	28.00 per cent.
Weight after 48 hours' immersion	989.0 grams.	878.0 grams.
Per cent. water after 48 hours' immersion	27.63 per cent.	28.63 per cent.
Weight after one week immersion	998.1 grams.	886.6 grams.
Per cent. water after one week immersion	28.80 per cent.	29.89 per cent.

Regarding the preceding Prof. Hilgard writes:

"I have examined the building stone from Santa Maria, sent by Mr. Ralph Marshall, so far as is necessary to determine its adaptability for a building stone from the chemical standpoint. I find that treatment with strong hydrochloric acid does not sensibly impair the firmness of the stone, although a little lime and magnesia is dissolved; also some iron from the rusty spots, which become white in consequence. It is not therefore liable to disintegration from the acids that may occur around a sugar factory. Under the microscope, it is seen to consist of partly decomposed 'volcanic ash' or pulverized pumice. The clay formed by this decomposition renders it fairly refractory, so as not to be easily deformed in the fire; although it cannot be called fireproof. It could doubtless be used in the building of the lime-kiln without danger of collapse. Being easily cut and worked, I should consider it a very suitable stone to be used in the construction proposed."

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CEMENT AND LIME.

POINTS ON PORTLAND CEMENT



PORTLAND

(3) Strength, cohesive and adhesive.

(4) Time of set.

The soundness of a cement is a most important point, as it is evident that, no matter to what fineness it may be ground, or what strength it may develop at the earlier dates, if it eventually expands and disintegrates, it is not only of no value as a constructive material, but it is at once converted into a destructive agent. The most reliable test for the soundness of cements, in the author's opinion, is that which was introduced a few years ago by Mr. Faija. It essentially consists in subjecting a freshly gauged pat to a moist heat of 100 degrees F. until set and afterward placing it in warm water for the remainder of the twenty-four hours.

The fineness of grinding of a sample largely determines its usefulness as a constructive material, as it is well known that the finer a cement is ground the better will be the results obtained from it when mixed with sand or aggregate. Looking back at some old testing books of fifteen years ago 20 per cent. on a fifty sieve was not an uncommon residue to find recorded; eight years ago it had been reduced to 10 per cent., and now many manufacturers ordinarily grind down to 5 per cent.

A matter which is often overlooked in testing a cement in this particular is the thickness of the wire of which the gauze is composed. It is obvious that if the wire of a sieve having the specified number of holes to the square inch is abnormally thick, the size of the hole will thereby be reduced, and *vice versa*, and in some instances may cause the rejection of a cement which would otherwise pass the specification.

The strength of a cement is generally ascertained by means of its resistance to a tensile strain, as being the easiest and most convenient test to carry out.

The correct amount of water to be used in gauging cement varies greatly, and no hard and fast rule can be laid down on this point, each cement requiring a quantity peculiar to itself, depending largely on its fineness and setting properties.

The disposition to specify excessive tensile strains at seven days is not so prevalent as it was a short time back. Experience shows that high strains generally require high percentage of lime, and to get the high strains sometimes asked for, it is absolutely necessary to "lime" up to the verge of "blow." In such cases extreme care is necessary in the manufacture.

The time of set of a cement is only of importance where it is either abnormally quick or abnormally slow, except of course in special cases such as tidal work, where it is desirable that cement placed in position at low water should be sufficiently set to prevent the rising tide separating it from the aggregate. The most important point, in the set of a cement, is what is generally known as its initial set, *i. e.*, when hardening or crystallization

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the treatment which it sometimes has to undergo at the hands of inexperienced users, makes it a matter for wonder that failures are not more frequent. One of the most prolific causes of failure is insufficient attention to the setting properties of the cement under treatment. In very hot weather it is no uncommon thing for a cement to have a very quick initial set, and in using such a cement, therefore, in order to obtain its full strength, it must be mixed and in its alloted position within a very few minutes of adding the water. This often entails the mixing of very small quantities at a time, and if due precautions are not taken, a larger quantity is mixed than can be manipulated before setting commences. This generally results in the use of additional water, and the serious detriment if not total destruction of the setting properties of the cement. Many cases of failure have occurred, in which cement being of good quality, though somewhat quick setting, points strongly to over-manipulation or "killing."

Another frequent cause of unsatisfactory work is a dirty and unsuitable aggregate. The admixture of a very small proportion of dirt or loam is quite sufficient to materially deteriorate the strength of a concrete, and too much stress cannot be laid upon the necessity for seeing that all aggregates are free from any foreign dirty matter.

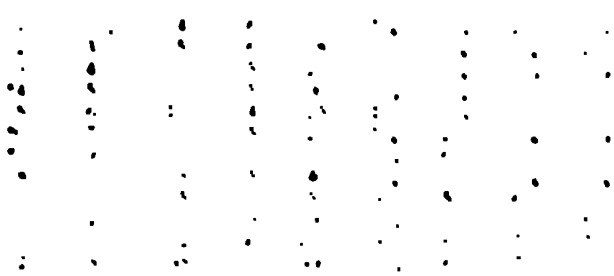
The neglect of the proper cooling or aeration of a cement is a frequent cause of trouble, and to insure satisfactory work, proper cooling cannot be too strongly insisted upon. Of course cement may give good results when used hot from the mill. It is advisable where cement is being used in considerable quantities to consrruct temporary cooling sheds, with a good dry-boarded floor, where the cement can be turned out of the sacks or barrels and thoroughly aerated before use.

The exposure to extremes of temperature has perhaps more to answer for in the shape of unsatisfactory work than is generally recognized. If exposed to a summer sun immediately after being gauged, naturally a great deal of the necessary moisture is evaporated, leaving the cement without sufficient to complete the crystallization already set up. The result frequently is that the work crumbles and shows signs of failure. On the other hand, exposure to frosts acts on the water, and by expansion destroys the surrounding concrete.

To summarize, the chief points requiring attention in the use of cement, in order to obtain the best results, are the following:

(1) Sound, well-ground cement, of steadily increasing strength.
(2) Due attention to the setting properties of the cement.
(3) Clean, well-proportioned aggregate.
(4) Proper maturing of the cement before use.
(5) Protection from extremes of temperature.

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[illegible]

[illegible] OF CEMENT MATERIAL

[illegible]

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dent and general manager; Charles H. Ramsey, of Howe's Cave, secretary and treasurer; Sheldon Norton, of Hokendauqua, Pa., superintendent.

The manufacture of the natural cement is being carried on the same as formerly, and the machinery for the manufacture of the Portland cement will be installed as rapidly as possible. A night and day force of workmen will be kept at work at the installation as soon as such work can be done advantageously. It is expected that the machinery will be in place ready to manufacture the cement by the middle of May or the first of June. Several large contracts have already been received. A plant with a capacity of three hundred barrels of cement a day will be installed at first, but it is expected that this will be increased by next season to a one thousand barrel plant. This is one of the largest deposits of cement material in the United States.

MAINE LIME MEN THREATEN TO STRIKE.

ROCKLAND, Me.—A general strike in all the lime rock quarries in Maine is threatened, and unless some understanding is reached between the quarriers and manufacturers a general paralysis of the industry is probable. All the quarriers employed here are now out on strike, and it is expected that their action will be followed by the kilnmen throughout the state.

This is the season when lime in Boston and New York is supposed to be in greatest demand, and a strike at this time, the quarriers say, will bring the manufacturers to terms. Several of the leading manufacturers, while admitting that the situation is critical, decline to make any statement. It is understood that the manufacturers here are willing to resume paying the kilnmen $2 a day, if the Rockport and Thomaston manufacturers can be induced to raise the wages of their men from $1.50 to $1.75 a day.

Owing to the superior quality of Rockland lime and the better facilities for its manufacture, they would be able to compete with these towns, but to pay these men $2 while Rockport and Thomaston can get men at $1.50 is a losing investment for them. From the present outlook it is probable that all of Maine's great lime industry will soon be in comparative idleness.

ANCIENT CONCRETE WALLS WITH STONE FACINGS.

WHEN cut stone was used for facing concrete walls it was cut into small cubes, often not more than six inches square, but the size varies according to the nature of the material. Such Roman walls may be seen in many parts of England. When marble is used it is cut into slices, and the concrete wall is covered with marble. Originally such walls were covered with wood only; the wood has perished and has left the marks of it only, and the grooves for the posts and rails to which the boards had

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EXPORTS DECLARED

For the United States. Returns from Consular districts for quarter ended September 30, 1897:

BELGIUM.	
Antwerp—	
Cement	$30,293.78
Stone	5,863.53
Brussels—	
Cement	135,365.95
Marble	398.59
Charleroi—	
Cement	6,771.84
Marble	3,125.16
Ghent—	
Cement	500.84
DENMARK.	
Copenhagen—	
Cement	1,197.35
DOMINION OF CANADA.	
Bathurst—	
Stone (grindstone)	3,601.00
Moncton—	
Grindstones	1,085.00
St. John—	
Cement	785.00
Lime	5,083.30
Granite—Rough	509.00
Polished	288.50
Port Joggins—	
Grindstone	5,845.00
Montreal—	
Cement	2,126.44
FRANCE.	
Bordeaux—	
Cement	130.08
Cette—	
Lithographic stones	1,128.89
Lille—	
Carved stone	322.00
Lyons—	
Marbles for mosaics	142.80
Marseilles—	
Cement	5,610.25
Marble	5,314.40
Paris—	
Millstone and marble	7,263.00
GERMANY.	
Bremen—	
Cement	9,098.26
Brunswick—	
Cement	5,841.00
Frankfort—	
Cement, Portland and other	14,467 37
Freiburg—	
Stone Cement	123.45
Hamburg—	
Cement, Portland	239,834.31
Hanover—	
Cement, Portland	48,307.11
Mainz—	
Cement	47,834.36
Nuremberg—	
Lithographic stones	20,310.40
Sonneberg—	
Slate pencils	7,315.36
Stettin—	
Cement	$72,639.77
Stuttgart—	
Pumice stone	572.29
ITALY.	
Carrara—	
Marble:	
Blocks	102.996.95
Slabs	821.00
Statuary	16,204.10
Worked	4,305.85
Cubes	4,050.50
Florence—	
Marble statuary	21,589.00
Genoa—	
Stone, pumice	332.81
Leghorn—	
Marble:	
Blocks	1,972.65
Statuary	1,669.36
Pumice stone	1,989.20
Messina—	
Pumice stone	1,883.00
Rome—	
Statury (marble) and pedestals	5,823.01
Venice—	
Marble statuary	2,234.07
Stone (rough)	535,84
MEXICO.	
Mexico City—	
Onyx	80.00
Veracruz—	
Onyx	10,095.22
SWEDEN AND NORWAY.	
Christiana—	
Marble	783.64
Stockholm—	
Cement	11,429.43
UNITED KINGDOM.	
Aberdeen—	
Granite, polished	33,680.52
Carlisle—	
Stone, building	243.80
Dublin—	
Granite blocks	99.84
Hull—	
Cliff stone	587.14
Liverpool—	
Cement	54,850.31
Slates, bricks and tiles	4,530.70
London—	
Cement	101,368.21
Stone, marble, granite, etc ,	2,576.87
Newcastle-on-Tyne—	
Cement	3,056.16
Grindstone	7,917.80
Sheffield—	
Grindstones	245.83
Troon—	
Hone stone	594.84

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ALLEN WALTON



Hummelstown Electric Light Co., of the Quarrymen's Association of Philadelphia, and a director and vice president of the Hummelstown National Bank.

Mr. Walton's ancestry were members of the Society of Friends, and to the faith of his fathers he remained uncompromisingly and loyally true, the teachings of this denomination noticeably influencing his whole life, and forming the foundation principles of his character.

He was blessed with an exceptionally jovial disposition, and frequently gave expression to true wit and humor. This made him a most congenial companion, and the time spent in his society a pleasure.

The most prominent traits of his business life were industry, energy, foresight and integrity. He was capable of and did sometimes perform a prodigious amount of work, and he never felt that labor was degrading.

He was kind, considerate and just, and never forgot one of his men or their families who were hurt, or who had grown old in his service. His life is an eloquent lesson to young men of what sobriety, industry, perseverance and square-dealing may, under the blessing of God, accomplish in the way of a successful life.

His domestic life was beautiful for the love and affection which he had for his own. He had the nature of a true poet in his ardent love for trees, flowers, birds and rural scenes. In his conservatory he had collected, at great expense, many rare curiosities of plant life, and he was never more happy than when among his flowers.

And he was kind to the poor. If ever there was a man who found pleasure in helping others it was he. And by far the greater part of what he did was unknown, save by those who were the recipients of his beneficence. He abhorred making a show of charity. But among those who will miss him most are the poor who always found in him a generous friend.

THE PONT DU GARD, NIMES, FRANCE.*

THE Pont du Gard, was among the first of the great Roman engineering works to be built in the countries conquered by them, and was probably constructed by Agrippa, the governor at Nimes, France, under the great Augustus, about the beginning of the Christian era, and is still in good condition, due to the perfect and solid construction and to repairs which have been made from time to time. Hamlin in his "History of Architecture," says "these Roman works of utility were in many cases designed with an artistic sense of proportion and form which raises them into the domain of genuine art. A remarkable effect of grandeur was often produced by the form and proportions of the arches and piers, and an appropriate use of rough and dressed masonry. They are im-

*Subject of Frontispiece in this number.

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Europe. Italy, Sicily and Spain were the first countries in which a revival took place, and in these we find the earliest developments of what was to them a new feature of architectural ornament. The new buildings of Venice and Pisa became resplendent with colored marbles, both internally and externally applied, and the Duomo at Venice is a very early and remarkable application of colored marbles to exterior architecture. The shafts of the small pillars are of various colored marbles, while incrustation of porphyry and other precious materials of like nature enrich the surface of many parts of the building.

Florence affords many notable examples of this description of architectural ornament, and in Giotto's celebrated tower, the practice of paneling, and otherwise adapting, various colored stones for ornamental purposes, is extensively pursued and treated with admirable taste and skill. Indeed, throughout this period of mediæval architecture in Italy, the practice prevailed of building in courses of colored masonry, and it became in truth a characteristic feature in the buildings of that age in Italy. Doubtless something was also due to the fact that in Spain and Italy alike the quarrying of ornamental stones was an ancient industry. The Roman emperors and the early conquerors of Spain had alike gratified their taste for color and of luxury by a lavish use of the materials they had found ready to their hands; and some of the best examples of ancient marble decoration are still to be found in these counties.

In England, the taste for decoration by means of colored and polished stone did not take deep root until centuries later. Our old church builders relied for effect upon the lines of shaft and archway, and of groined roof. When color was used it was usually in the barbaric form of a pigment applied to the surface of a common building stone. The time came when a passion for whitewash gave us interiors without a vestige of color, and walls as bare and cold as those of prison cells. But the latter half of the present century has shown a wonderful development, and many fine examples of the decorative use of colored stone are now to be found in our own country. Some reason for this is no doubt due to the facilities for travel, which have made the south of Europe more accessible to London than Edinburgh was a century ago. But we owe more, perhaps, to facilities for the transport of ornamental stones themselves, which modern methods have afforded us. Practically, the ornamental stones of all countries are more easily obtained by the architect of to-day than Rome could obtain the product of Carrara in far-off times. The result has been a revolution which is still in progress.—Stonemason.

"Please continue STONE as we are always pleased to receive it."—*Foley Bros., Olean, N. Y.*

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PLATE 5.

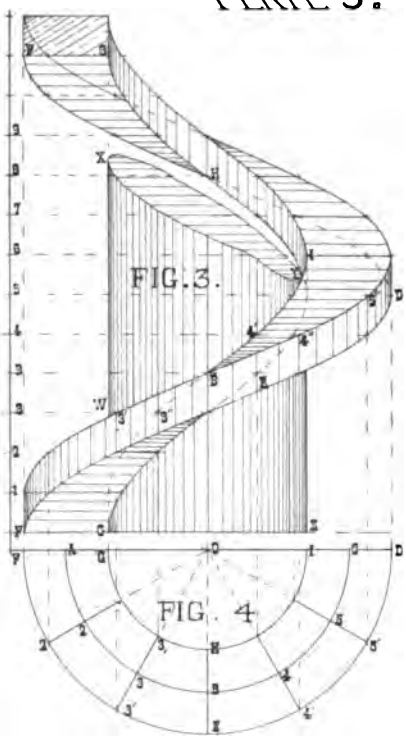


FIG. 3.

FIG. 4.

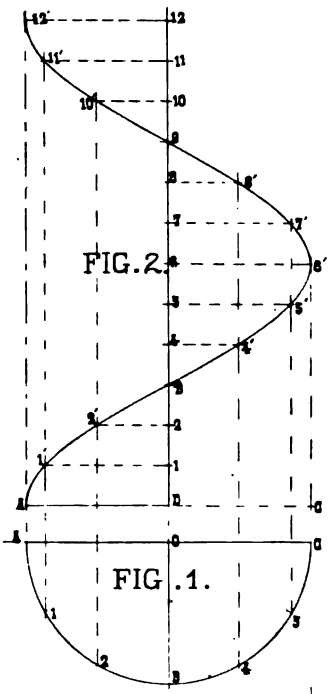


FIG. 2.

FIG. 1.

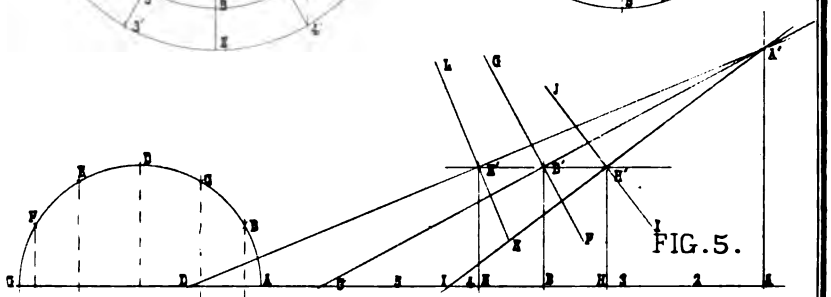


FIG. 5.

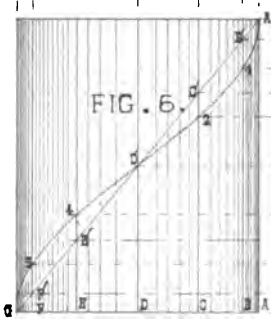


FIG. 6.

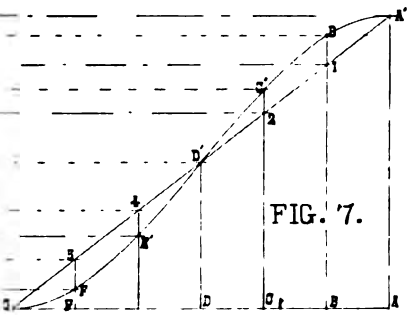


FIG. 7.

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OPPOSING THE SCHEME.

A WRITER in the Bangor Daily News is after the National Slate Mining and Roofing Company with a sharp stick. Some two years ago an organization was formed at Pittsburgh called the "Pittsburgh Roofing Association," the avowed object of which was to secure better prices for the slate roofers. The association asked manufacturers and dealers to sign an agreement pledging themselves not to sell slate in that territory (which was limited to within fifty miles of Pittsburgh) to any one not a member of the association. They secured very few signers to such an agreement, and these only under threat of a boycott. A year later the same parties formed the National Slate Mining and Roofing Company, and extended its scope to a large part of Pennsylvania and Ohio, and succeeded in getting nearly every manufacturer and dealer to sign their agreement. After giving the scheme a year's test the manufacturers and dealers in Bangor and Pen Argyl have concluded that the workings of the association have proved an injury to their trade, and nearly every one has withdrawn from the organization. It is claimed that the demand for Bangor and Pen Argyl roofing slate has fallen off greatly in sections where the association is in full control, and that the arbitrary restrictions will result in a still larger curtailment. A very interesting fight is promised between the association and the manufacturers and dealers who have heretofore been its members.

AMERICAN SLATE ABROAD.

PRIOR to 1895, says James L. Foote, general manager of the Slatington-Bangor Slate Syndicate, to the New York Commercial, the United States sent very little slate abroad. The great Welsh quarries supplied Europe. But in 1896 occurred the great strike at the Penrhyn quarries in Wales, which have a capacity of 2,000 squares a day, and employ from 2,000 to 3,000 men. It was a long strike and a bare market in Europe gave American slate producers a chance. We took advantage of it, increased our

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THE GENUINE BANGOR SLATES

THE [illegible] Bangor Roofing Slate Manufacturers' Association, [illegible] at all [illegible] The Genuine Bangor Slate has been [illegible] the Association proposes to protect [illegible] rights [illegible] The Association has been in existence over three years and has [illegible] a great benefit to [illegible] A [illegible] and [illegible] slate are made [illegible] and when the [illegible] has the [illegible] that he has [illegible] Bangor [illegible] In no manner is the Association [illegible] [illegible] from its membership

SLATE FOR ROOFING.

THE [illegible] in the United States over the merits of slate [illegible] are numerous and many [illegible] have to [illegible] and [illegible] the slate centers to the [illegible] and [illegible] [illegible] on the part of the slate men [illegible] [illegible] [illegible] Wherever [illegible] [illegible] the same advantages [illegible] over [illegible] [illegible] [illegible]

It is understood that a dividend has been declared on the capital stock out of the earnings of last year.

We see it stated that the slate rubbish, the accumulation of one hundred years at the quarries at Delta, Pa., heretofore an expensive nuisance, is to be utilized and made into articles of commercial value by parties who have been negotiating for its purchase.

The Keystone slate quarry, at Chapman Quarries, Pa., which has been closed down for the past few months, has again resumed operations.

A London company, it is reported, has purchased a large tract of land in the vicinity of Carlisle, Pa , from which it is expected good slate material for roofing can be procured. The product of the quarries will be shipped direct to the London wharves.

Mr. W. H. Hughes, a member of the Vermont Slate Company, has written from London, where he recently arrived, saying that this year there will be quite an active demand for roofing slates. The orders that are being received from abroad this year are said to be for a wider range in kind or variety. There is a stirring business activity in England, where, it is said, in many towns 90 per cent. of the new structures are covered with slates. Germany is also using slates to great extent, and the demand will be active from that market. The recent shipments show a decided increase to both points.

The Piedmont Slate Company will be formed to develop slate quarries near Cedartown, Ga. W. M. Kelley & Co. are interested in the enterprise.

All of the Monson (Me.) slate quarries are now at work on the ten-hour system. There is a growing demand for the products of the slate mill, and the Monson Maine Slate Company have a large number of orders ahead on which they are working. The Monson Consolidated Slate Company will manufacture more mill stock and less roofing slate this season. The Monson-Burmah Slate Company have removed nearly all of the debris from their pit, the result of the slide last fall, and will be ready to resume the manufacture of slate and mill stock about April 1.

The Albion Slate Company, of Bangor, Pa., has elected the following officers: President and treasurer, Conrad Miller; secretary, Birge Pearson; directors, Conrad Miller, Birge Pearson, Charles N. Miller, Dr. William H. Vale, D. C. Blair, R. S. Brown and J. C. Miller.

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OUR FOREIGN TRADE IN STONES, ETC.

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

OFFERS TO FURNISH MARBLE AND STONE FREE

THE [illegible] W[illegible] [illegible] [illegible] [



Secondly. A preacher down East found a text for his Sunday morning sermon in the announcement that the quarries had been opened for the season's work. His "firstly" metaphor was thus expressed: "Men are drilling out for themselves an existence in this troublesome world. It is hard work and slow work, but great is the accomplishment!" The unorthodox would probably say that quarriers who "are drilling out an existence," at a dollar a day's drill, must find it pretty hard to believe that "great is the accomplishment," and yet that would come nearer to the real truth than the preacher's illustration. There's mighty little can be accomplished, either for himself or society, by the man who goes to work at seven in the morning and quits at six in the evening, and has drilled out in that span of his existence a paltry dollar in cash, or its equivalent in credit at the company's store. It's a far stretch to point a moral for a Christian character by a metaphor so pointless as that.

What the Matter is with Quincy. On last St. Patrick's day, at a banquet of the Granite Manufacturers' Association, of Quincy, Mass., ways and means were discussed how to "drive out the snakes" tha are said to have become entwined about the granite industry of the town. If one must accept the inference in the speeches as a correct report of conditions then the granite business of Quincy is in a deplorable state sure enough. But these speeches were made at a banquet, and there were oysters on the half shell, green turtle soup, cucumbers, brandied peaches, frozen milk punch, frozen pudding, striped ice cream, and the cold conservatism of New England on the menu, and this may have had some effect on the off-hand oratory. There were no potations, vinous or spirituous, available to counteract dyspeptic effects. The orator of the evening was John L. Miller, a prominent citizen and manufacturer. His conclusions as to the cause of the lethargy into which Quincy is supposed to have relapsed, was thus expressed:

> Gentlemen, the time has gone by for waiting for something to turn up. This waiting policy has strangled our business; something must be done, and that at once. * * * Shall this epoch stop this year, or shall we drift, drift, drift? * * * Gentlemen, our production is costing too much. We should have the very latest machinery in quarry, shed and polishing shop. We should have, and must have, a railroad into the quarries on the common.

Then he advised them the way to accomplish all this if they were too poor individually, was to consolidate, and construct "a central station that shall distribute power by compressed air to every quarry," place the cutting sheds and polishing shops around this station; put crushers in the quarries and go for the road building trade. He thought such a combine could command all the capital it needed. He urged immediate action.

Hon. Russell A. Sears, mayor of the

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[illegible] of the [illegible] interpretation [illegible] dressed stone and [illegible] what's the matter with Quincy?

What is "Dressed" Stone? A [illegible] Supreme Judicial Court [illegible] of St [illegible]. It is to decide what is and what is not dressed stone within the meaning of an ordinance of the Municipal Assembly passed last April and which provides that all stone used in city work shall be dressed within the limits of the State of Massachusetts. That is the same sort of law as legislation that several states have enacted, but the interpretation of the law as to what is and is not dressed stone in the meaning of such laws is so far as we know without a precedent decision. Hence we can [illegible] are the precedents of the St [illegible] Island in making up a decision on the point. Neither the men [illegible] are materially interested in [illegible] of the state laws enacted we understand [illegible] does the point. Indeed it is a point [illegible] injunction to settle [illegible] by the court and [illegible] that is [illegible] of whatever [illegible] whether [illegible] and [illegible] [illegible] [illegible]

stone is dressed, that scabbling stone is dressing it, and any other stone from which the rough edges have been taken off at the quarry is dressed stone. On the other hand, if it decides that sawing is not dressing, then neither are the other manipulations at the quarry to be so considered. There seems no way out of the difficulty except by an arbitrary ruling, and that may result in trouble more serious than the original grievance.

* * * * *

And this leads us again to contemplation of the nefarious enactments of the New York and other state legislatures on this dressed stone matter. At the behest of local trades unions in the large cities, backing cliques of contractors and blackleg politicians, laws in restraint of the trade of other states have been enacted; the filching of the legitimate trade of one community to fatten the trade of another community is ordained by statute, and yet we are supposed to be a united and patriotic people. Sumptuary legislation is declared to be injustice; unwarranted interference with the commerce between the states is termed law-breaking, and oppression of organization on the individual, whether exemplified in the capitalistic combine or the labor union, is tyranny of the most flagrant kind. But these penalties are not enforced. It is such toleration that is driving the American people rapidly toward the danger point of a revolution that will threaten the liberties that have been so dearly bought. No more conspicuous over-riding of what is right has been given legal status than this discriminating law relating to stone-working, by which the stone of one state may not pass the boundary line of another state except it be in condition to contribute benefit to one class of citizens in one section, while it takes away the opportunity of benefit from the citizens of another section. It is like saying to a man from Maine, you may not sell a beaver hat of Maine production in New York, because it interferes with the silk hat industry of New York State. If it be justice to deprive the stone-worker of Maine of the right to sell his manufactured product in New York, why wouldn't it be just as right to bar out the beaver hat in the interests of the sweat-shop product of New York?

Cuba's Commerce and Resources. With peace once more in Cuba, and its brave people freed of the domination of the oppressor, that marvelously rich country will afford opportunity for investment of American capital and an exhibit of American enterprise such as no section on this, or any other continent, now offers. We may be assured these will be promptly forthcoming from the day Cuba takes its place in the list of American republics. Cuba is much more to us, in a commercial sense, than any Central or South American nation, important as every one of them are to us, though more important to them are we, as the table of imports and exports given on another page shows. Cuba's natural resources are infinite in variety. It will perhaps be information to most of our readers to learn that the island is very rich in marbles, in onyx, in jasper, in sandstone and granite. It is said a marble nearest in color and quality to the famous Cararra, of any known, exists in immense abundance. Also, it is said, the richest colored marbles abound. A country so bounteously favored needs only the patient and helpful influence of republican government to give it place high up on the list of prosperous and contented peoples. This, thank God, it is about to have.

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SELECTED MISCELLANY.

TRADE UNIONS AND POLITICAL ECONOMY

A MISCELLANEOUS SUBJECT

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the church was called. And they took a very fine stone which belonged to the Saracens, and placed it as the pedestal of a column, in the middle of the church, supporting the roof. It came to pass, however, that Sagatay died. Now the Saracens were full of rancor about that stone that had been theirs, and which had been set up in the church of the Christians, and when they saw that the prince was dead they said one to another that now was the time to get back their stone, by fair means or by foul. And that they might well do, for they were ten times as many as the Christians. So they got together and went to the church and said that the stone they must and would have. The Christians admitted that it was theirs indeed, and offered to pay a large sum of money and so be quit. Howbeit, the others replied that they would never give up the stone for anything in the world. And words ran so high that the prince heard thereof, and ordered the Christians to arrange to satisfy the Saracens, if it might be, with money, or to give up the stone. And he allowed them three days to do either one thing or the other. The Saracens would on no account agree to leave the stone where it was, and this out of pure despite to the Christians, for they knew well enough if the stone were stirred the church would come down by the run. So the Christians were in great trouble. But they did do the best thing possible; they besought Jesus Christ that he would consider their case, so that the holy church would not come to destruction, nor the name of its patron saint, John the Baptist, be tarnished by its ruin. And so, when the day set by the prince came around they went to the church betimes in the morning, and lo! they found the stone removed from under the column; the foot of the column was without support, and yet it bore the load as well as before. Between the foot of the column and the ground there was a space of three palms. So the Saracens had away their stone and mighty little joy withal. It was a glorious miracle; nay, it is so, for the column still standeth, and will stand as long as God pleaseth.—Pittsburgh Dispatch.

INCIDENT IN THE EARLY HISTORY OF WASHINGTON MONUMENT.

"RECENTLY there have been references made in the Star of the laying of the corner stone and dedication of the Washington National Monument," says an old East Washington man, "and one writer intimates that there are few if any living who took part, as he, in both processions. Perhaps he is right as to the few survivors of the two processions, but there are hundreds who were boys when (in 1848) the corner stone was laid and were spectators of the scene, some of whom took part in the dedication proceedings. I know of a number who, like myself, joined in at least three processions connected with the monument and helped to haul the corner stone.

"It was early in 1848, I believe, when the stone was being hauled from the Baltimore & Ohio depot, then at Pennsylvania avenue and Second street northwest, to the ground, a long string of oxen being attached to the truck, when the Fourteenth street bridge over the canal gave way, the wheels of the truck going through. Intelligence by word of mouth reached the navy yard and the workmen at once held a meeting and resolved to volunteer their services to extricate the stone and haul it to its destination. A line was at once formed, General Henderson, of the Marine Corps, loaning us a flag and furnishing field music (drum and fife), and we marched up the then dusty avenue to Fourteenth street bridge.

"Here, under the direction of our foreman, we soon had lifted the wagon and moved it south of the canal, and attaching ropes, we relieved the oxen, and to the music and cheers, the stone was hauled to the ground. There were perhaps three hundred of us, and I can name a dozen or so yet living.—Washington Star.

THE IRONY OF FATE.

CLOSE to the curb line at Trinity avenue and 132d street, in the borough of the Bronx, stands a granite block which fate has so ar condemned to uselessness. Twice it has been selected for a corner stone, once for a playhouse for the amusement of the living and the other for a resting place for the dead. Neither edifice was built. Portions of the inscriptions

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rolling stock, and there are no machine shops to keep up. The cost of repairs is reduced to a minimum. Few men comparatively are required to operate this marine railroad. Most of the dangers of land railroads are eliminated, and there are other compensating advantages.

The transports are 324 feet in length, and forty-six feet beam. Twenty-eight cars of ordinary length make a load, in the aggregate about 1,500 tons. In general appearance, without their deck loads, the transports resemble nothing so much as huge canal boats. In loading and unloading, a dock of special construction is, of course, necessary. The railroad tracks run from the shore upon a huge apron, from which the cars are shunted to the deck. Once in position, each car is carefully secured against the possible effects of rough weather.

The towing steamer and its two transports form an impressive spectacle, suggestive of a marine caravan. The length of cable between the boats is 1,200 ft., and the steamer, the cables, and the transports stretch out to a distance of nearly two-thirds of a mile. A crew of fifteen men is carried on each of the steamers, and of six on the transports. The only present means of communication between the boats is a code of whistles, but a telephone system may be devised.—A. S. Chapman in Cassier's Magazine for April.

THE POWERS OF LIQUID AIR.

A TABLESPOONFUL of liquid air poured on about a fluid ounce of whisky will freeze it at once into flat scales, giving the whole the appearance and color of cyanide of potassium. This may be emptied out on a table and will remain frozen in that condition for fully five minutes. One thing that impresses one is that while all molecular motion is practically arrested at this temperature, the odor is perfectly distinct, showing that these particles which stimulate the sense of smell are active and independent of the temperature. A handkerchief of either silk, linen or cotton, saturated with the liquid, will be charred and destroyed just the same as if it were put in an oven and browned, though no change of color is apparent. Its evaporation is quite slow and it may be carried about for a number of hours in an open vessel without entirely disappearing.

It probably represents a compression of about seven hundred atmospheres, and would, therefore, in a confined space and at 60 degrees temperature, represent a pressure of somewhere from ten to twelve thousand pounds to the square inch.—Tradesman.

WHAT THE KLONDIKE STAMPEDE MEANS TO TRADE.

WHAT does an exodus of 100,000 to the Klondike mean to the business of the country? I have figured it out on the basis of cost and proportion as ascertained, and it is this: That each man of them would average first and last an expenditure of $600, making a grand total of $60,000,000. The United States railroads would get $5,000,000 of this; Seattle merchants and hotel-keepers, for outfits and transient guests, $25,000,000; the prospector's home town and towns en route to Seattle and other Pacific coast points, $5,000,000; ship companies, for transportation to Alaska, $10,000,000; and for the transportation of freight over passes and in Alaska, $15,000,000. This would represent only the actual needs of this many prospectors, and would cause a large increase in other business directly connected with it. It means that in 1898 $60,000,000 will be spent in search of gold in the yellow creeks, and in the same year not more than one-fourth of that amount will be produced. But the output is likely to come nearer the expense as each year goes by, and in a few years to exceed it.

The predictions for the receipts from the Upper Yukon in 1898 are guesswork, although the latest returned miners make it appear that it will be over $20.000,000. But if it is $12,000,000, the most conservative estimate now offered, it will be wonderful, and will mean that with all the willing hands now there and the hundred thousand or more who go in 1898, the yield for 1899 will approximate $50,000,000. After that it depends on transportation facilities to get people and machinery into the country to multiply the placer yields, and a few

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From The Book of the Indians of North America Boston Rev. ed. 1841

STONE MOUNTAINS

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PRESERVATION OF ANIMALS IN MENAGERIES

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BALTIMORE, MD.

Matters are very quiet here at present, and since my last writing nothing much has shown up.

The bill I spoke of in my last letter, in reference to a $400,000 appropriation for the Fifth Regiment Armory, has passed both House and Senate and now is before the governor for his signature. The appropriation has been cut to $300,000.

A new theater is being talked of, to cost $70,000; also a good contract for a church at McDonough has been let. It will have Bedford stone trimmings with a local green stone for body of building. This is on the Western Maryland railroad.

An eight-hour bill has been passed in the Legislature for city employes and all contract work for city. Also a bill through the city council requiring all contractors on city work to employ only registered voters of the city, and to pay them the maximum rate of wages, as paid by the city of Baltimore for each respective craft or laborer. Each will become a law. We have been fighting a long time for these laws and have at last secured them.

Baltimore, Md. WILKERSON.

WASHINGTON, D. C.

The Senate has passed a joint resolution providing for the appointment by the President of a commission to take charge of the matter of collecting the funds for the erection of the statue of General Lafayette, to be unveiled in Paris on United States Day, the Fourth of July, during the Paris Exposition, the statue to be presented to France by the United States.

The Senate has also passed the bills, one providing for a monument to mark the site of the Fort Phil Kearney massacre. The bill directs the Secretary of War to mark the site by erecting a monument of rough masonry and a historical tablet. The other authorizes the erection of a statue of the late President Abraham Lincoln at Gettyburg, Pa. It provides for an appropriation for $50,000 for a statue and for a pedestal, and the preparation of a site for and the erection of the statue at Gettyburg, under the direction of the Secretary of War.

The Senate has passed the joint resolution authorizing the National Reunion Monument Association to erect a monument in the city of Washington to the Union soldiers, sailors and marines of the war of the rebellion.

Other bills before Congress for the appropriation of certain sums for the erection of statues in honor of distinguished citizens, are: Granting land in Colorado as a site for a monument to the memory of Abraham Lincoln.

For the purchase of the statue of Salmon P. Chase; appropriation, $25,000, the statue by Wills.

Joint resolution to carry into effect the two resolutions of the Continental Congress directing monuments to be erected to the memory of General Francis Nash and Wm. Lee Davidson; appropriation, $10,000.

Authorizing the erection of a memorial to Hon. Robert Morris, at Washington; subscription to be solicited from the general public or otherwise.

For the erection of a monument to the memory of the soldiers that fell at the battle of Talladega in 1813; appropriation, $25,000.

For the erection of a monument to Travis, Bonham, Bowie and Butler for gallantry and heroism during the Mexican war; appropriation, $25,000.

In regard to a monumental column to commemorate the battle of Princeton; appropriation, $30,000.

Granting permission for the erection of a monument or statue in Washington City in honor of the late Albert Pike; appropriation, total, $12,000.

Granting permission for the erection of a bronze statue in Washington of Daniel Webster; appropriation for pedestal, $4,000.

For the erection of a monument to the memory of Meriwether Lewis.

It is stated that there is on foot a movement to present to the National Capital, a statue of the late temperance reformer Frances E. Willard, the statue to be made by a woman, the fund to pay for it being collected by women only. At the present time, there is not one statue in this city, of a woman. It is said that the women interested in the movement wish to have the statue placed in Statuary Hall, or if this cannot be done, in a public square.

At a recent hearing of the Senate Committee on Education and Labor, on the bill providing

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Seventh and Central streets, the same to cost about $100,000.

Dix Bros., of the Phœnix Cut Stone Company, this city, who opened up a quarry at Silverdale, in southeastern Kansas, a year ago, met with such decided success that they find it necessary to build a spur from the Missouri Pacific (Dexter branch) to their quarries, and surveys have now been made for that purpose. They are also negotiating for the erection of first-class machinery and saw mill in order to deliver sawed stone to the trade direct from the quarries. ENGEL.

Kansas City, Mo.

PEORIA, ILL.

Plans are out for several dwelling houses to cost from $3,000 to $5,000. They are mostly all frame, hence are not of interest to the stone trade.

Plans are being prepared by Reeves & Bailey for the Incurable Insane Asylum building, to be located at Bartonville, adjoining the lower end of this city. The building is intended to accommodate the central west part of the state. Two years ago plans were accepted showing a central and administration building with wards attached. Some of those buildings have been erected at a cost of $50,000, but were located over an abandoned coal mine. They are in danger of falling and are to be taken down. The original plans are being changed to the cottage system. The indications are that the walls will have stone facing. SCALLY.

Peoria, Ill.

DAYTON, OHIO.

The bridge which I mentioned in my last letter was let Feb. 26 to the King Steel Bridge Company, of Cleveland.

I am not yet able to give any exact news about the proposed new union depot here. There is much talk about two or three other big buildings, but nothing definite. D'ONOFRIO.

Dayton, O.

FAIRMONT, W. VA.

The building season here has begun with several stone foundations and frame dwellings; one brick store with a few stone trimmings is just finished; a good sized dwelling of pressed brick and stone trimmings is in course of erection, but there is not much stone work to be done here at present. At Manington, a town twenty-one miles from here, there are two churches to be built, one a Methodist church of pressed brick and stone trimmings, and the other it is undecided whether to make it a brick or frame structure.

In the town of Smithfield, thirty-five miles from here, they are erecting a new bank building, with stone trimmings.

On the Monongahela river, near Morgantown, W. Va., they are building two locks of concrete, the first of that kind in America.

Fairmont, W. Va. ABERNETHY.

ROCHESTER, N. Y.

Business in the stone line is a trifle brighter than last month, one firm having three contracts on hand; two are residences, one out of Indiana limestone and one out of Lockport (N. Y.) limestone. Their other job is basement trimmings for the new court house at Geneseo, N. Y.; the basement out of Leroy limestone, the trimmings out of sandstone.

Quite a little work on the canal improvement both for masons and stone-cutters. The work is being rushed as rapidly as possible, so as to have it in shape by the time navigation opens in May.

The stone-cutters have notified bosses that eight hours constitutes a day's work after May 1, which they think they will have no trouble in getting. MCELROY.

Rochester, N. Y.

SOUTH BEND, IND.

Architects are competing for a church for the Hungarians of this city; cost not stated.

Also the Board of Education have decided to build an eight-room school house, subject to the city council. W. T.

South Bend, Ind.

ST. LOUIS, MO.

The Brown job on Twelfth street and Washington avenue is under way. The mayor signed the ordinance to widen Twelfth street and the Brown company secured 350 feet and will move back. J. L. Stewart & Co. are the contractors; the stone is buff Bedford, which is being cut here.

There was also let two public school buildings, to cost about $150,000. C. Stafford is the successful bidder; Bedford stone. The school

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on them now as the high water in June would be sure to catch them, so nothing will be attempted until fall. ALLAN.

Pueblo, Col.

MANSFIELD, O.

The State Legislature has made an additional appropriation of $40,000 to complete the wall which will inclose the grounds of the Ohio State Reformatory at Mansfield. The stone used in the foundation (which is not yet completed) is Mansfield sandstone. Above grade line the wall will be 25 feet high, 5 feet wide at base and three feet on top, and will be built of Sandusky (O.) limestone. The coping will be one foot high and four feet wide and will be of native sandstone. The wall when completed will be close onto a mile long. Kammacher, of Columbus, O., is the contractor; Joseph Manastere is superintendent for the state.

The new church building to replace the old Zion Lutheran structure in Sandusky will be of stone. and will cost about $100,000. It will be well into June before anything is done toward building.

Mr. Vernon H. Redding has plans for a residence in Galion, O. Cost, $15,000; buff pressed brick; stone trimmings.

The building committee of the German Lutheran church have not yet accepted the plans for the new church building.

The quarries here report business better and prospects look brighter. O'CONNOR.

Mansfield, O

FT. WORTH, TEX.

The stone trade continues very quiet here.

The approaches to the new union depot will be let on the 25th. There is 2,000 yards of first-class bridge masonry and 1,000 yards of rubble masonry to be let on the above dates. When the superstructure will be let no one knows except the depot company. It is reported that the plans call for all stone.

There was a court house let in Orange, Tex., on March 15. McKnight & Robinson are the contractors; pressed brick and Pecos red sandstone trimmings. Jas. R. Gordon, San Antonio, is the architect, and is also architect for a new court house at Giddings, Tex., to be let in April.

Plenty of rumors of a few good buildings to go up here in the "Fort," but it seems to be only rumor so far. But throughout the state there seems to be a few small jobs with more or less stone in them coming out all the time, and from all reports the stone industry will be fairly busy the coming season. TEXAS.

Ft. Worth, Tex.

GRAND RAPIDS, MICH.

There has been let to local contractors a six-story brick and steel building, to be used as a permanent exhibition building for Mr. Dudley E. Waters. The successful contractors are Houser, Hayden & Queen. The contract is about $130,000. There is very little stone to be used. Nordella & Owen have the steel and carpenter work. M. T.

Grand Rapids, Mich.

SPRINGFIELD, O.

Governor Bushnell is going to build a fine vault in Fern Cliff Cemetery. It is to be built of Vermont granite. The contract has been let to a Detroit firm.

There is talk of the city building a city jail to cost $20,000.

There are quite a number of frame houses going up at present. The old Champion shops that have been idle for six years has started up again. HARRIS.

Springfield, O.

DETROIT, MICH.

The building committee April 6 decided to have the stone for the completion of the new county structure taken from the Berea Company's quarry No. 6, because the supply is ample and the stone of a uniform color and quality. This action indorsed the report of Chairman Scovel, of the committee, and Felix Meyers, the expert who visited the company's quarries recently. Contractor Robinson has a $30,000 stone-sawing plant nearly completed. The tramway for the handling of stone is one hundred feet long and has a span sixty feet wide. The plant has a capacity for seventy-five to one hundred stone sawyers. Work on the upper stories of the building will be begun in two or three weeks.

Detroit, Mich.

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NOTES FROM QUARRY AND SHOP.

The item in March STONE relating to the purchase of the Ashland (Wis.) Brownstone Company's property by the Portage Entry Quarries Company, of Chicago, stated that the latter company controlled the Malone Stone Company's quarries in Ohio. The statement is erroneous. While there are personal relations between the two companies that might have led to such a statement, members of the family Malone being interested in both; yet there is no business relations of the nature indicated in the report between the two companies. Both are operated as distinct enterprises, and each successfully.

Jeffersonville, Ind.—The Globe Cement Company is erecting more kilns, and will increase the capacity of its mill to seven hundred barrels per day.

The plant of the Alpha Portland Cement Works, at Whitaker, N. J., is now running night and day getting out a rush order of cement for the United States government, which is being shipped to various points where the work of preparing fortifications is being carried on. Between 2,000 and 3,000 barrels are being turned out daily. The large force of men also work Sundays hurrying the orders out.

The old lime kilns in North Carthage, Mo., which have lain idle for so long, are to be started again as quick as they can be repaired, and one is actually in operation now. The company now in control of the kilns is known as the Spring River Lime Co., and the parties interested are W. B. Hill, of Kansas City, his brother, Judd Hill, and sister, Mrs. Barton, of Springfield. It is also said that Chas. W. Goetz, of St. Louis, is a stockholder. The company owns and operates ten kilns at Ash Grove, three at Everton, and two at Galloway. Mr. J. H. Barton, of Springfield, will manage the affairs of the company. The new company has eighteen men at work at present. One kiln is in operation and a second one is being rebuilt. There are two more old kilns which are in bad shape from long disuse and they will probably be rebuilt later in the year.

Near Durlach, in Baden, the tombstone of a hundred-year-old Roman veteran has been discovered. It was erected, probably, in the third century after Christ, to Flavius Sternis by his son and heir, Flavius Vehemens.

After a week's shut-down, to take an inventory, since the sale of the Mussey Stone Company to the Cleveland Stone Company, the Mussey quarry was opened up for work on March 27. The rumor that it was possible that the quarry might be abandoned and a large number of men be thrown out of employment is without foundation. The quarries in question are the source of supply for a particularly fine grindstone, a special quality being in demand at Sheffield, England, alone.

In Manitoba you can turn a furrow many miles long and not encounter a stone as large as your fist. The earth, for a distance down from three to five feet, is a rich, black loam, made by centuries and centuries of decaying vegetation.

Washington, D. C.—Bids were opened at the Treasury Department April 4 for the construction of the Chicago post office building, including the granite, steel, and iron roof and fireproofing. There were sixteen firms represented in the bids, and several firms had a number of bids for different kinds of granite. The lowest bid was by John Pearce, of New York, for Mt. Waldo (Me.) granite, $1,987,000. The next lowest was by Wardbury & Layton, of Boston, for Deer Island granite, $2,000,000. The third lowest was by the Amberg Granite Company, of Chicago, for Amberg (Wis.) granite, $2,150,-

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000. The other bidders were: Manning, Dulbay & Co., Washington, $2,663,000; New England Granite Company, Concord, N. H., $2,398,000; Prescott & Co., Albany, N. Y., $2,594,449; also another bid, $2,378,449; Shead & Co., Toronto, $2,620,000; L. L. Leach & Son, Chicago, four bids ranging from $2,437,384 to $2,856,745; McIlvain, Megerford & Co., Pittsburgh, $2,189,570; Griffort & McDermott, Chicago, four bids ranging from $2,512,000 to $2,291,000; Bentley Contracting Company, Milwaukee, four bids, ranging from $2,553,300 to $2,658,000; Norcross & Co., nine bids, ranging from $2,488,000 to $3,203,000; McArthur Bros., Chicago, four bids, from $2,281,000 to $2,394,-000; P. J. Carlin, Brooklyn, $2,449,900; John Pearce, New York, three bids, from $1,987,000 to $2,387,000.

Herm M. Zapel Stone Company, Chicago, certified to a change of name to the Independent Stone Company.

W. S. Kapp has purchased the partnership interest of D. M. Karns in the Bluffton (Ind.) Granite and Marble Works.

The East Conshohocken Stone Quarry Company, Conshohocken, Pa., has leased the quarry, the machinery, tools, etc., to a new company that will be known as the East Conshohocken Stone Company. Possession was given the lessees April 4. The new company is composed of John Prince, S. F. Jacoby, Robert Peoples, Charles Hart and John Ackton. All the members of the new company are builders and contractors of Philadelphia.

Brandon, Vt.—The Brandon Italian Marble Company, whose mill was burned a short time ago, has decided not to rebuild here, but will locate at Middlebury, where it will build a new mill and finishing shop.

Smith's Basin, N. Y.—Flood & Serill have leased the Thomas Brayton stone quarry for five years, and John Grady has sub-leased it and will run the quarry this season.

The old marble firm of Ivey & Vincent, in Galena, Wis., has been dissolved, Mr. Vincent having gone to Klondike. The business will be continued by Mr. Ivey.

Ed Brecht and Lewis Tiffany have leased the old Buck stone quarry near Glenwood, Pa., and will work it the coming summer.

The marble house of Dodge & Baker, of Webster City, Iowa, has purchased the business now conducted by J. C. Johnson, of Eagle Grove. They will not take possession until June 1.

Messrs. Archer & Clapp have bought out the Birmingham (Ala.) Marble Works, owned by Thos. H. Holt.

The Mankato (Minn.) Lime and Stone Company's quarry was sold to Mary E. Craig, of New York, to satisfy a mortgage for $8,000, including costs and disbursements, held by her. The bid was $8,850. The Lime and Stone Company has a year in which to redeem the property.

Lyman H. Pratt has sold his interest in his New Milford, Pa., stone quarry to Moses Shields, Jr. Consideration, $7,500.

Columbus, Ind.—F. P. Smith has sold a half interest in the marble and monument business to B. M. Hutchins.

Mahoningtown, Pa.—Graham C. Harper has leased the stone quarry on the Phillips farm.

Thomas Skelton, of Fenton, Mich., will go into the marble business at Mt. Pleasant.

Mr. George Haines has bought out the interest of Mr. Graber in the marble works, both at Winchester and Luray, Va.

Fitchburg, Mass.—E. W. Terrill has sold his large granite quarry to Jeremiah Shea, who has taken possession.

Gallipolis, O.—Judge H. P. Hanna has purchased a half interest in the marble firm of J. T. Callahan and assumed charge.

Cleveland, Tenn.—The Cleveland Stone and Marble Company is the style of the new firm that has recently bought out John W. Boyd, on Inman street, J. L. Hinson and C. D. Bair, proprietors.

East Longmeadow, Mass.—J. F. Norcross is preparing for a busy season in his new quarry. David Durantaye is also opening a new quarry.

Chicago, Ill.—The Dolese & Shepard Company, with a capital stock of $500,000, has been organized out of the Chicago and Naperville Stone Company and the effects of Dolese & Shepard. By the new company the receivership for Dolese & Shepard, who failed last spring, is terminated. The new organization will be officered as follows: President, T. P. Phillips; treasurer and general manager, W. E.

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Phillips; secretary, H. S. Martin; superintendent, D. Plummer; directors, T. P. Phillips, J. Dolese, Jr., George T. Smith, W. E. Phillips, D. Plummer, J. A. Kelsey, N. G. Moore.

A movement is on foot to develop the slate quarries of Northfield, Vt., which have not been worked for several years.

Westfield, Mass.—The purchasers of the plant of the New England Trap Rock Company have organized a new company under the name of the Hampden Trap Rock Company, and will at once take measures to build a railroad from the quarry to the Boston and Albany railroad. J. S. Lane & Son will open a new quarry some distance north of their present one this season, and if so the spur track might be made available for both concerns.

West Sullivan, Me.—It is reported on good authority that the Stimpson plant is soon to be operated by local capital. A company of Sullivan Harbor gentlemen with plenty of means and plenty of chances to secure practical foremen will take hold of the plant and do a general stone business.

Chillicothe, O.—Mr. H. A. Barnhart, proprietor of the Barnhart Marble Co., has leased two hundred acres of land near Allensville, in Vinton county, which is a ledge of red sandstone, resembling in appearance, color, wearing quality and in every other way the famous Kilbuck brownstone. He proposes to establish a quarry there as soon as possible and to begin the work of getting the rock out ready for the market.

Howardsville, Va.—The Alberene Soapstone Company has nearly completed the opening of its new quarry and will begin to use it in a short time. A stratum of very fine green stone was struck very recently. It is reported to be very pretty and of better quality than the average stone.

Volant, Pa.—A stone quarry has been purchased by some Sandy Lake capitalists and will be operated this summer. A sidetrack and tramway will be put in and a force of workmen employed during the season.

Chicago, Ill.—The Western Stone Company has closed down its yards at Lemont and discharged all the employes. This is said to have been due to the demand for an increase in wages demanded by the quarriers, and which was refused by the company. President Madden says that the closing will be permanent, but some persons believe the yards will be reopened May 1.

The receiver's sale of the Berlin and Montello Granite Company's real estate and personal property took place at Berlin, Wis. E. J. Nelson, of Chicago, bought the real estate for $2,000, subject to mortgages and attachments. The personal property consisting of crushed stone and blocks, was sold at $250.

A. J. Richter, of Springfield, Ill., who bid in quarry property at Montello, and E. J. Nelson, who purchased the quarry property in Berlin, are representatives of a syndicate which, it is said, contemplates operating the quarries after the sales have been confirmed by the court.

Any information you may be able to give us in regard to monumental stock and acquainting us with parties who furnish finished work, and prices, will be gratefully received.—Richardson & Ogg, 626 Fourth street, Portsmouth, Va.

In the stone yard of Andrae & Co., Milwaukee, Wis., the elevated tracks which carried two large cranes by which stones were lifted, collapsed, and the whole structure, engine and all, fell twenty-four feet to the yard below. The engineer, Harry Nothohm, escaped uninjured.

Newark, N. J.—Bernard Gerberick, stone, reported to have given judgment for $164.

The Hampton Falls marble mill at Fair Haven, Vt., owned by Dr. Johnson, was burned. The fire started from sparks from an engine. Loss, $3,000; no insurance.

H. B. Cross, one of the pioneers of the granite business at Montpelier, Vt., died of consumption at his home in that city on March 30, aged 68 years.

Organized labor won a victory in the New York Supreme Court, before Judge Russell, in the case of John Toscani against the Italian Marble and Enamel Mosaic Workers' Association. The plaintiff claimed the Association obtained his discharge from every job he got because he was not a member of the union. He also claimed that, although he was willing to become a member, they refused to receive him. He brought suit for damages and injunction to restrain the union from interfering with him. The union moved to dismiss the complaint on the ground that the plaintiff had failed to put

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the necessary allegations in his complaint to sustain his alleged grievances. The Court coincided with view and dismissed the complaint.

Youngstown, O.—Shortly after midnight March 23 half a ton of dynamite stored in a vacant building at Hillsville, a quarry station on the Mahoning branch of the Pittsburg and Lake Erie railroad, exploded with terrific force, completely wrecking the building and partially demolishing a number of nearby cottages occupied by Italian quarriers. Several persons, whose names could not be learned, were more or less seriously hurt. Lightning struck the building.

Charles T. Russell, a former Consul-General from the United States to England, is prosecuting Percy T. Applegate, Brooklyn, N. Y., with criminal libel. Russell is president of the Connecticut Granite Company, and Applegate is the secretary. The charge was based on affidavits made by Harry A. Kemble and Thomas Pendell. Mr. Russell said that the affair grew out of troubles in the Connecticut Granite Company. He said that he had appointed Applegate secretary, and that later when two factions sprung up in the management of the concern Applegate deserted him and went over to the other side.

There is a curious monument over the grave of J. S. Jacobs, at Lincoln, Ky. The stone is cut in the shape of an old-fashioned traveling satchel, and on one side is the name of the deceased, and on the other the words, "Here is where he stopped last." The young man was of a very roving disposition, and the stone was erected by his father.

Chagrin Falls, O.—John Rock, the Cleveland capitalist who recently purchased the extensive stone quarries west of town, formerly owned by the Globe Stone Company, has secured heavy contracts for stone to be used in harbor improvements along the lake, and has let a large contract of stripping to Cleveland contractors. A gang of sixty-five men and twenty teams are now at work and the force will be increased to one hundred men.

Judge Showalter April 8 dismissed the proceedings begun in October, 1894, by William L. Breyfogle and others against John R. Walsh, the Equitable Trust Company and others, involving a transaction in regard to the Bedford Stone Quarries Company, of Bedford, Ind., and a line of railroad connected with that property. In the proceedings charges were made against the defendants that they had so handled certain financial interests of the corporations that the complainant's interests in them were greatly damaged. The case went to the United States Court of Appeals on demurrer, but was submitted to Master in Chancery Booth, who reported that the charges made by the complainants were not sustained. By reason of this Judge Showalter entered an order dismissing the suit.

The Philadelphia Press says that the following unique inscription is on a monument erected at the grave of Rev. J. Wesley Webb, D. D , in Huntington, W. Va.: "Here lies the body of J. Wesley Webb, a firm believer in the Lord Jesus Christ, Jeffersonian Democracy and the Methodist Episcopal Church."

Watertown, N. Y.—David G. Shalton has started an action to recover from the Davidson Marble Company $865.88, which amount is alleged to be due him on two notes and for labor and services.

Poughkeepsie, N. Y.—Miller Bros., marble, reported to have appointed receiver.

St. Johns, N. B.—Kane & Co., marble, reported to have given judgments for $13 and $334.

Dubuque, Iowa.—William V. Gill, marble, reported to have been sued for $280.

Jackson, Mich.—Thomas B. Lynch, marble, reported to have given chattel mortgage renewal for $250.

South Ryegate, Vt.—Messrs. Farquharson, the brothers Beaton, Goodfellow, Goodine and McConbach have bought out the Blue Mountain Granite Company for $3,000. They have taken possession of the property and commenced work.

Benjamin Quillman has sold his marble yard property at Norristown, Pa., to Patrick McGrath for $18,000.

Beaver Dam, Wis.—John W. Miller is now sole proprietor of the marble and granite works in this city, he having purchased the interest of his partners, Messrs. Turner and Blumenthal.

Chillicothe, Ill.—Thomas Kirk, of Lacon, and S. E. Hoof, of this city, will establish a marble yard.

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Minoa, N. Y.—The firm of Worden & Stevens, dealers in granite and marble, having dissolved partnership, Mrs. C. A. Worden will still carry on the business at the old stand under the name of Worden Bros.

Middletown, Pa.—The marble works of the late John F. Auch has been sold to A. H. Luckenbill, of Schuylkill Haven, who has taken possession of the works.

Pittsfield, Mass. — Mrs. Theodore Harold Clapp is reported to have sold the soapstone quarries in Dalton, near Waconah Falls, to George Booth.

Poultney, Vt.—H. H. Matthews & Co. have bought the old slate mill belonging to the Ruggles estate, together with machinery, which is being moved to the company's quarries at Hampton.

Newport, Tenn.—The Tennessee River Brownstone Company has leased the brownstone rock quarry of the Welcker heirs, and it will be placed in operation immediately.

Albert Krautch intends to open a marble and granite shop at Appleton, Wis., within a short time.

Richwood, O.—Harlow Clark will open up a marble dealer's shop.

Springville, Utah.—Frank and James Whitmore, Henry Murray, with several other Springville parties, have located a marble quarry of the same nature as the Buckeye marble quarry, in which Don C. Robbins, Angus M. Cannon and other Salt Lake people are interested. The new location is situated some two miles east of the Buckeye marble quarry.

C. S. Pyle, Kennet Square, Pa., will open a stone quarry in the spring.

James Kane, marble dealer of Centerville, Mich., will locate marble works in company with Mr. Thurston, of Sturgis.

Eudora, Kan.—Parties are now contemplating the erection of a stone crusher here, and are negotiating with Mr. Chas. Lothholz for the purchase of land.

The firm of Ray & Terrell, of the Decatur (Miss.) marble yard, has been dissolved, Mr. Terrell having purchased the interest of Mr. Ray. The business will be conducted at the same place.

Charlottesville, Va.—M. Kaufman has leased the plant of the Albemarle Slate Company and has equipped same.

Cleveland, Tenn.—J. L. Hinson and Charles D. Blair have bought the Cleveland Marble Works from John Boyd, and will at once engage in he business.

Napoleon, O.—John L. Halter has disposed of his half interest in the marble works to D. F. Rohrs, of Wauseon. The new firm is Rohrs & Musser.

E. Kuyl, of the Ottawa (Ill.) Marble and Granite Works, and Robert O'Meara, of the La Salle Marble and Granite Works, have consolidated their interests under the firm name of Kuyl & O'Meara. The main works will be operated in Ottawa, with a branch house in La Salle.

Chillicothe, O.—Mr. James H. Gorsuch, who recently opened a monumental business here, has disposed of his entire stock to the Barnhart Granite Company.

Elyria, O.—The Mussey Stone Company's quarry has been sold to the Cleveland Stone Company, and the quarries here and at South Amherst will be closed temporarily.

John W. Miller has recently purchased the interests of his partners, Messrs. Turner and Blumenthal, in the Beaver Dam (Wis.) Marble and Granite Works.

J. W. Barlow has purchased the Belding quarry at Mason City, Iowa.

Poultney, Vt.—H. H. Matthews has purchased the Ruggles estate, the old slate mill in the swamp, including the tools, and is moving them to his red slate quarry in Hampton. He has also leased the quarry of R. A. Williams and will commence operations at once.

Minneapolis, Minn.—Judge Lancaster has set May 1 as the last day on which claims may be filed against the insolvent Minnesota Hydraulic Cement Company.

Milwaukee, Wis.—The Amberg Granite Company has filed suit against Peter Schmidt and Fred Andreas to recover $854.42 alleged to be due on account.

In the case of Willis D. Williams vs. the Consolidated Stone Company, Bloomington, Ind., for $10,000 damages, for injuries received in a

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quarry accident last summer, the jury gave a verdict for plaintiff in the sum of $3,500.

An award of $3,500 was made by arbitrators against the city of Reading, Pa , for damages caused to the stone quarry of Witman Bros., in the construction by the Park Commissioner of the Mt. Penn boulevard.

Piqua, O.—The Ohio Marble Company, marble, reported to have given real estate mortgage for $8,075.

Reedsburg, Wis.—S. A. Collins, marble and granite dealer, is arranging to put in power and several new appliances that will enable him to greatly increase his output. He has recently purchased the Elroy Marble Works, and is extending his business in every direction.

New Galilee, Pa.—Joseph Hartman has decided to open the stone quarries here and a number of men will be put to work at once.

Kankakee, Ill.—Donald Sinclair, proprietor of the large crushing plant in the Illinois Central gravel pit, is making arrangements to put up a similar crusher at Grand Tower, Ill. The productof the Grand Tower plant will be used by the Illinois Central for ballasting on the Calro short line and the Chicago & Texas line, a recent acquisition.

Mt. Pleasant, Iowa.—Messrs. C. G. Gloecker and Henry Traut have embarked in the tombstone business.

Martinsburg, W. Va.—The Standard Lime and Stone Company has purchased one hundred acres of land near Martinsburg for the purpose of extending operations so as to include the limestone deposits on the land.

The Kankakee (Ill.) Stone and Lime Company is erecting a new pump house on the old quarry. It is rumored that the company intends to develop that quarry, which has been idle for many years. The West Side quarry is to be opened up in two weeks.

Higginsville, Mo.—A rich deposit of asphalt has been discovered on the property of the Confederate Soldiers' Home and will probably be developed. For information address Dr. B. C. Jones.

Lyndon Center, Vt.—George Kent will put up a building the present season and go into the granite and marble business.

Cedartown, Ga.—The Piedmont Slate Company will be formed for the development of slate quarries near Cedartown. Address for further information W. M. Kelley & Co., who are said to be interested in the enterprise.

Bergen, N. Y.—A largely attended meeting of the Iroquois Portland Cement Co. was held recently. Jacob Davis gave a sketch of the enterprise. It is estimated that the plant will cost $600,000 and be entirely fire proof. The company wants Bergen people to take $50,000 worth of stock.

Chillicothe, Ill.—Messrs. Thomas Kirk, of Lacon, and S. E. Roof, this city, will establish a marble yard here.

The Bullard quarry at Swanton Junction, Vt., will be opened soon by Lieut-Gov. Fisk and E. T. Bradley, who have leased the property for a term of years. As soon as the weather permits they will put in a steam quarrying plant.

Pittsford, Vt.—The Vermont Marble Company has bought the Nelson Loveland farm for $5,450. This farm lies on the west side of Otter creek, a short distance from the railroad statiod. It has several valuable marble quarries on it.

The Marble, Mantel and Tile Setters' Union, of St. Louis, report every man in the trade organized.

Columbus, O.—The large saw sheds of the Fish Cut Stone Company gave away and were swept down by the flood. This will prove a serious loss to the company. All the minor sheds, used as shelters for the workmen in summer and bad weather were swept away, and the gates of the canal, at the river locks, were destroyed.

Newark, N. J., machine stone workers struck for eight hours and a uniform scale of wages.

Harrisburg, Pa.—In the matter of the application for a writ of quo warranto against the Old Bangor Slate Company, of Northampton county, alleged to be violating the company store law, Deputy Attorney General Reeder allowed the writ. A motion for a rule to compel the Old Bangor Slate Company, of Bangor, Pa., to show cause why proceedings against its tenure of charter should not be instituted was filed in the Dauphin county court by the Attorney General's department.

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New York Machine Stone Workers' and Rubbers' Union has demanded a uniform workday of eight hours and an increased scale of wages, beginning June 1.

The quarries of the Western Stone Company, at Lemont, Ill., will remain closed during April, unless other arrangements can be made between strikers and employers than those proposed by President Madden, of the stone company. The president's ultimatum of $1.25 a day during April, and $1.50 per day throughout the remainder of the season, was declined by the 300 strikers, who firmly hold out for 15 cents an hour for all work, allowing the company the right to fix the length of the day. Mr. Madden at the close of the conference announced that the quarries would remain closed during April.

The Journeymen Stone-Cutters' Association will hold a convention at Rock Island, Ill., beginning on the first Monday in August. This will be an important meeting, as it is the first national gathering in four years. Many changes in the constitution which will affect local stone-cutters will be discussed.

The Tippecanoe Pulp and Grindstone Company is a new Cleveland, O., corporation. The capital stock is $50, with the privilege of increasing it to $100,000.

W. H. McWhirter Company, of New York City; to dress stone; capital, $10,000. Directors, W. H. McWhirter, Robert G. McWhirter and Joseph Lomax.

The Delaware and Hudson Stone and Construction Company, of Port Jervis, N. Y., has been organized with a capital of $100,000. The directors are: W. S. Bouto, J. G. Hillard and L. H. Smith, New York City; J. T. Stickney, Ellenville; F. S. Little, Brooklyn.

The McDermott Stone Company, of McDermott, O., has been incorporated for the purpose of quarrying and manufacturing building stones and grindstones. The company is authorized to issue $100,000 in capital stock.

Catskill Quarry Company, of Catskill, N. Y.; capital, $10,000. Directors, H. A. Shaper and William N. Johnson, of Palatine Bridge; T. H. Reddie, of New Brunswick, N. J.; Andrew Randall, of Catskill, and B. J. Jayne, of New York.

The Portland (Ore.) Granite and Stone Company. The capital stock is $25,000, and the incorporators John W. Goss, Edward W. Bingham and Clarence W. Avery. The objects are to develop sandstone, granite and marble quarries in Oregon, Washington and Idaho.

The Fairview Stone Crushing Company, with a paid-up capital of $50,000. The incorporators are John J. Duff, of New York City; Isaac M. Van Wagner, of Nyack, N. Y., and John W. Heck, of Jersey City, N. J.

The Lawrence Limestone Company, New Castle, Lawrence county, Pa.; capital, $1,200. Directors, John Reis, W. K. Johnson, Charles H. Johnson, George W. Johnson, New Castle; W. C. Kirkland, Beaver.

Montello, Wis.—The Berlin and Montello granite quarry, together with the water power, real estate, machinery, and all other personal property except finished monuments and quarried stone, was sold at a receiver's sale to E. S. Richter, of Springfield, Ill., for $500, the purchase being subject to attachments and mortgages amounting to about $65,000. It is understood that the purchaser intends to resume work within a few days.

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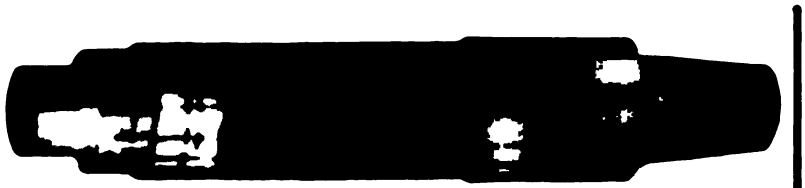
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Hallowell, Me.—After being out two weeks, the differences which have existed between the Hallowell Granite Company and the Granite Cutters' Union in regard to the new contract of wages, have been satisfactorily adjusted, and the men have returned to work. The contract calls for minimum rate on day work of 30 cents per hour, instead of 22½, as under the old schedule. There are now two classes of eight-cut work at 50 cents and 55 cents, instead of one class at 50 cents. The "piece" workmen will have tools found and carried, the same as day men, and one apprentice will be allowed to every fourteen cutters, instead of one to every five. The tool sharpeners will receive the same as under the contract of 1895—30⅝ cents per hour. The new contract will run until March 1, 1900.

Baltimore, Md.—In the case of Engelbright & McQuade against Jones, Pollard & Co., in which $15,000 damages were claimed for alleged violation of a contract for furnishing crushed stone for electric railway ballast, Judge Phelps took the case from the jury, on the ground that the contract was one of impossible performance on account of the failure of the quarry—which run out—to produce stone for crushing.

Cleveland, O.—The Building Trades Council will make an effort to induce the stone quarry men employed in the Berea quarries to affiliate with the Council the coming spring. The quarriers are fairly well organized at the present time. They are affiliated with District Assembly 47, Knights of Labor. There are 5,000 of them.

El Paso, Col.—The Colorado Crystal Marble and Granite Company has been incorporated by James T. Stewart, J. F. MacMillan, C. B. Seldomridge, Nathan Oakes and William Banning; to operate in El Paso and Pitkin counties in the working of stone and marble quarries; capital stock, $600,000.

Baltimore, Md.—The building at No. 527 W. Pratt street, owned by Mullan & Son, marble dealers, was damaged by fire to the extent of about $1,000.

William Lister's Dunville, Wis., stone manufactory burned. Loss is $1,000.

Avon, N. Y., wants a monument works. Within a radius of six miles of that vilage there are eight cemeteries containing hundreds of unmarked graves.


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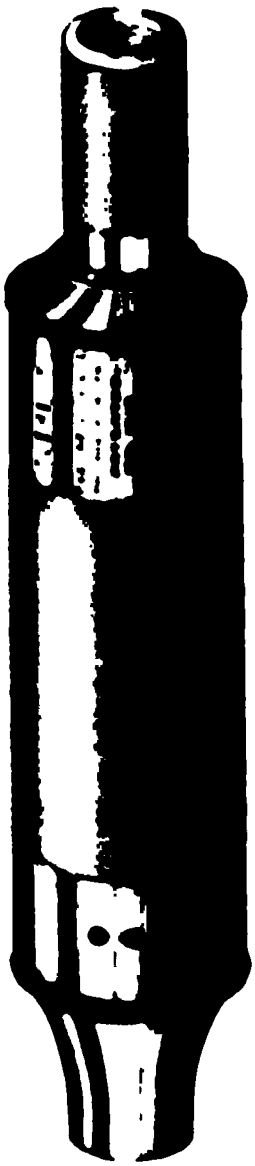
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West Side Crushed Stone Company, of New York City; capital, $1,000; directors, Lawrence J. Rock, James C. Mack and J. D. Campbell, of New York City.

H. P. Binswanger Company, of New York City; to operate stone quarries; capital, $20,000, and directors: H. P. Binswanger, of 22 East Eighty-ninth street; W. J. Judd and Max Stern, of New York City.

Jeffersonville, Ind.—The Golden Cement Company, with J. J. Louis and David Weber, W. E. Henderson and H. B. Pyne as incorporators. It has $15,000 capital stock.

Montclair, N. J.—The Osborne & Marsellis Company has been incorporated by Horace S. Osborne, Arthur S. Marsellis and Thomas S. Gladding; to operate quarries; capital stock, $50,000.

George Doyle, owner of the Hallowell stone mill and quarry, Bedford, Ind., died at his home in New York City.

Geo. F. C. Wilson, Greenville, Mich., a marble dealer.

Nyack, N. Y., is to have a new and important industry. A large stone crushing plant is to be established on the Hook Mountain. The Varker property has been purchased by capitalists. It consists of forty acres of land. A very large plant will be established for this purpose, and it will be larger than the ones at Rockland Lake and Tomkins Cove. The purchase includes millions and millions of tons of rock. The plant, consisting of a number of large buildings, extensive docks, etc., will be built at the foot of the mountain, by the river side. It is likely that from $75,000 to $100,000 will be spent in building the plant. We are not at liberty to mention the names of the men who are at the head of the great project. It can be said, however, that local parties are among those interested. Surveyors are now at work on the property. Two of them are Joseph P. Gazzan, of St. Louis, and H. W. Randenbrush, of New York. Work on establishing the plant will be commenced shortly.

Delaware and Hudson Stone and Contracting Company, of Port Jervis, N. Y.; capital, $100,000; directors, W. S. Boute, J. G. Hilliard, F. S. Little and L. H. Smith, of New York City, and J. T. Stickney, of Ellenville.

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The Michigan Alkali Works, of Wyandotte, Mich., will construct another chemical plant at Wyandotte, to furnish to dealers the finer chemicals, and at the same time utilize the material prepared by its other plant, and it is for this purpose that the new plant will be built. The structure will be an immense one, consisting of three buildings, having a total length of about one thousand feet. This will necessitate the expenditure of $250,000 at the very least and the employment of between 500 and 600 men. It is stated that Capt. Ford practically intends to double the present works at Wyandotte.

The Milwaukee Monumental Company has secured lands upon which they will open quarries. The company above named is the largest retail monument firm in Wisconsin.

Oakland, Va.—B. H. Hester and others will develop a soapstone quarry.

In the damage suit of Mrs. Hobbs against the Salem-Bedford Stone Company, a Bedford, Ind., jury has returned a verdict for $3,500. Mrs. Hobbs' husband was killed a few years ago while in the employ of the company at the mills in Bedford.

Boston, Mass.—A. L. Walker & Co., marble and granite, voluntary petitioners in insolvency.

Toledo, O.—The Malone Stone Company has brought suit against Henry P. Glann et al., to recover a judgment of $113,900 due on a promissory note.

New York City.—Justice Conlan has signed an order for the appointment of a receiver for the Stone-cutters' Association. The receivership is directed against William Stalker, the president of the union, and the asset which will be turned over is a deposit of $1,000 in the Twelfth Ward Bank. The receivership is the result of a judgment obtained by Joseph Connell against the union on December 9, 1896, for $405.96.

Springfield, O.—Samuel S. Taylor, stone quarry, reported to have canceled mortgage for $1,100; new mortgage, $1,100.

Allegheny, Pa.—W. W. Hazlett, doing business as the Walker's Mills Quarry Company, entered suit against J. R. Patton and H. W. Gibson, to recover $4,187.50, with interest, which alleged indebtedness arose from a contract for stone.

New York City.—James F. Dolan, stone, reported to have given judgment for $2,543.

The Bangor Royal slate quarry, at Bangor, Pa., has been shut down because a constable levied upon the personal effects, including the machinery, of Reittenhous & Cokefair, lessees of the quarry. The action was brought by employes of the firm, who hold claims amounting to $700.

The Woodbury (Vt.) Granite Company, of which John S. Holden, of Bennington, is the largest stockholder, has been petitioned into bankruptcy, this course being taken to make the affairs of the company more easy of settlement.

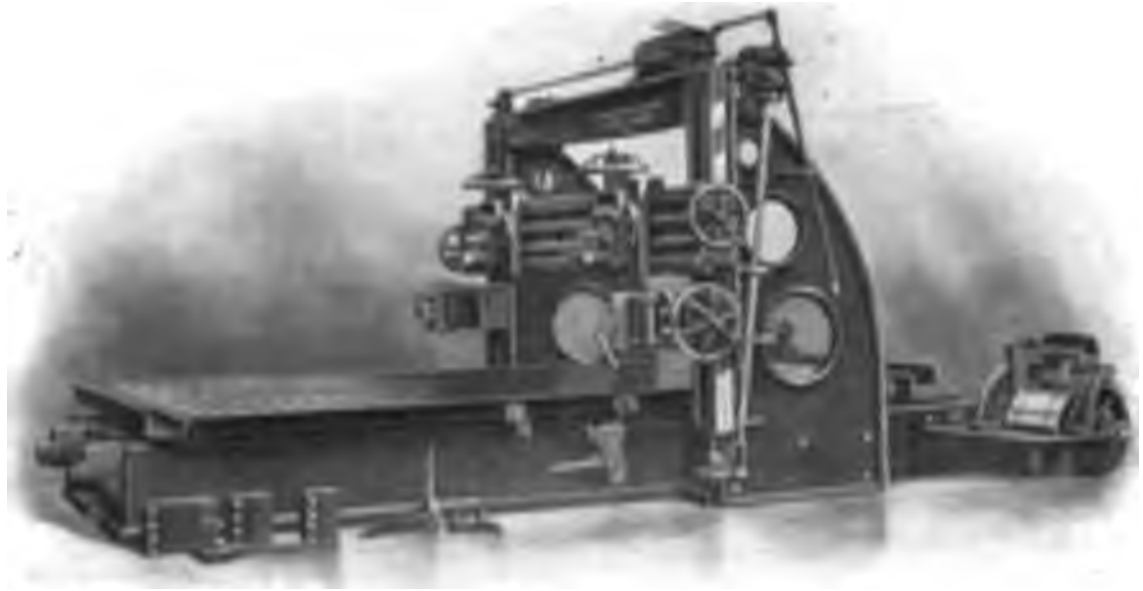
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CONTRACT NEWS.

Blackhawk county, Iowa, wants a new court house and there is talk of a building to cost $100,000.

Oakland, Pa.—The First Presbyterian Society will erect a new church to cost $50,000. Rev. W. J. Reid, pastor.

Circleville, O.—The Presbyterian Society has selected the plans prepared by H. C. Lindsay for the new church.

Mattoon, Ill.—The Congregational Society will build a modern church.

Braddock, Pa.—The First Presbyterian congregation of this place, Rev. W. G. Reagle, pastor, will erect a new stone church to cost $20,000.

Jeannette, Pa.—The Methodist Episcopal Society, Rev. H. J. Giles, pastor, contemplates a brick and stone church this spring, costing $40,000.

Dubuque, Iowa.—A movement is on foot to build a $300,000 brewery plant. J. H. Rhomberg is to be at the head of the project.

Evansville, Ind.—Plans are being prepared to be submitted to the trustees of the Jefferson Avenue Cumberland Presbyterian church. It is the intention of the trustees to build a new church or remodel the present one the coming summer. Estimated cost, $..0,000. Rev. T. Ashburn, pastor.

Evansville, Ind.—The St. Mark's Lutheran Society proposes to build a church this summer. Rev. Leander Goetz, pastor.

Indianapolis, Ind.—The Columbia Club has given up the option on the Christ church property and will expend $80,000 for a new building on the present site.

Utica, N. Y.—The First Baptist Church will ereet a new edifice.

St. Louis, Mo.—The Ancient Order of Hibernians have plans prepared for a $60,000 hall which the society expects to erect.

Villisca, Iowa.—The Presbyterian Society has taken initiative steps toward the erection of a $12,000 church. The following committee has been appointed to secure plans: Rev. T. K. Hunter, Elias Smith, A. J. Brislin.

Charleston, Ill.—The Catholic Society has decided to build a new church. A building committee has been appointed.

Helena, Mont.—The plans prepared by Chas. Bell, of Council Bluffs, Iowa, have been accepted for the new Montana State House.

Marengo, Ill.—Turnbull & Jones, of Elgin, have had their plans accepted for a $17,000 church to be erected by the Presbyterian church.

Montclair, N. J.—The M. E. Society is arranging to build a new church. Address J. Van Vleck.

Cape May, N. J.—The First Presbyterian Church will erect a new edifice. Cost, $13,000.

Philadelphia, Pa.—St. Mary's Polish Catholic Church has decided to build a fine edifice at the location of its present building. Cost, $18,000.

Canton, N. Y.—The St. Lawrence county board has decided to build a $25,000 jail.

Eaton, O.—The Preble county board has resolved to submit to the vote of the people April 4 the question of issuing $125,000 in bonds to build a court house.

Norwich, N. Y.—Calvary Baptist Church Society will soon erect a new church.

Leroy, Ill.—The trustees of the Cumberland Presbyterian church will contract for a new church at an early date.

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Canandaigua, N. Y.—The Methodists at this place will erect a $40,000 church. Rev. Dr. Campbell can inform.

Clinton, Mass.—The Congregational Church will erect a new church, to cost $40,000.

Savanna, Mo.—The citizens have petitioned the Andrews county board to arrange for building court house and jail.

Jackson, Mich.—The vestry of St. Paul's parish has chosen the plans prepared by Claire Allen for a church house to be built adjoining the church. Estimated cost, $15,000. Rev. R. Balcom, rector.

Creswell, Mich.—The Episcopal Society will build a new church. Work will be commenced in the spring.

Tolono, Ill.—The M. E. Society is preparing to build an $8,000 church at Tolono. Work will commence in May. Rev. T. D. Weens, pastor.

Clabourne, Tex.—The Methodist people of this city have a committee out to arrange for the building of a new church. It is intended to erect an edifice to cost about $20,000 and they are sanguine of success.

Montgomery, Ala.—The Western Railway of Alabama proposes to erect a modern depot. The depot will be built at a cost of $75,000. J. Herrin, superintendent, Montgomery.

Kirksville, Wis.—R. G. Kirsch & Co., of Milwaukee, have prepared plans for a $15,000 church for the M. E. Society.

Worthington, Ind.—The Official Board of the M. E. Society has decided to build a $10,000 church at once. Rev. J. W. Baker, pastor.

Findlay, O.—The Evangelical Lutheran Society is making preparations to build a new church in the near future.

Pittsburg, Pa.—D. H. Burnham, of Chicago, has been chosen architect for the $3,000,000 union depot to be erected at Pittsburg.

Marengo, Ill.—Turnbull & Jones, Elgin architects, have been retained by the First Presbyterian Church of Marengo to prepare plans for the new church. The building will be 70x85 feet, with a large tower, to be of pressed brick and stone, and will cost about $17,000. The same architects have just completed plans for a library for Marengo.

Hawley's Patent Sand Feed

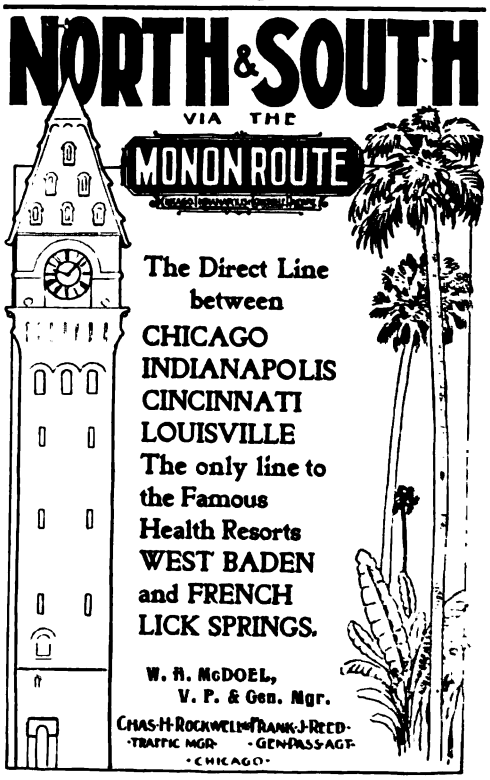
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BOOKS AND PERIODICALS.

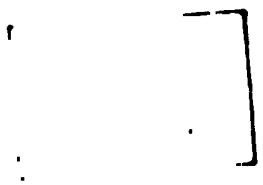
Bicyclists everywhere will be interested in the article on the League of American Wheelmen which appears in the April number of Frank Leslie's Popular Monthly. It is a well-written account of this great organization from its beginning in 1880, told by A. Cressy Morrison. There are more than twenty illustrations, including portraits and groups of wheelmen. In the same number Senator James H. Kyle has an article on "The Statesmen of Jackson's P riod," being the sixth paper in this magazine's series on Andrew Jackson. This also is profusely illustrated. The island of Martinique is interestingly described by Julius G. Tucker, U. S. Consul at that place. William Stevens Perry, Bishop of Iowa, contributes an elaborately illustrated article on the Episcopal Church in this country. The great interest displayed in the Alaska gold fields makes particularly timely and attractive the paper on "Gold Mining in British Columbia," which treats the subject from a geological as well as practical standpoint. Other interesting articles are "The Coastguard of England," "At the Foot of the Pyrennes," by Mary de Morgan, and "April Fool's Day." There are some excellent short stories, a striking installment of the new serial, "Marie Tremaine," an illustrated Easter poem, some fiction for young people, and a talk about new books.

"VICTOR SERENUS," A STORY OF THE PAULINE ERA, by Henry Wood, author of "Studies in the Thought World," "Ideal Suggestion," "God's Image in Man," "Edward Burton," "The Political Economy of Natural Law," etc. 12mo. Cloth. Price $1.50.

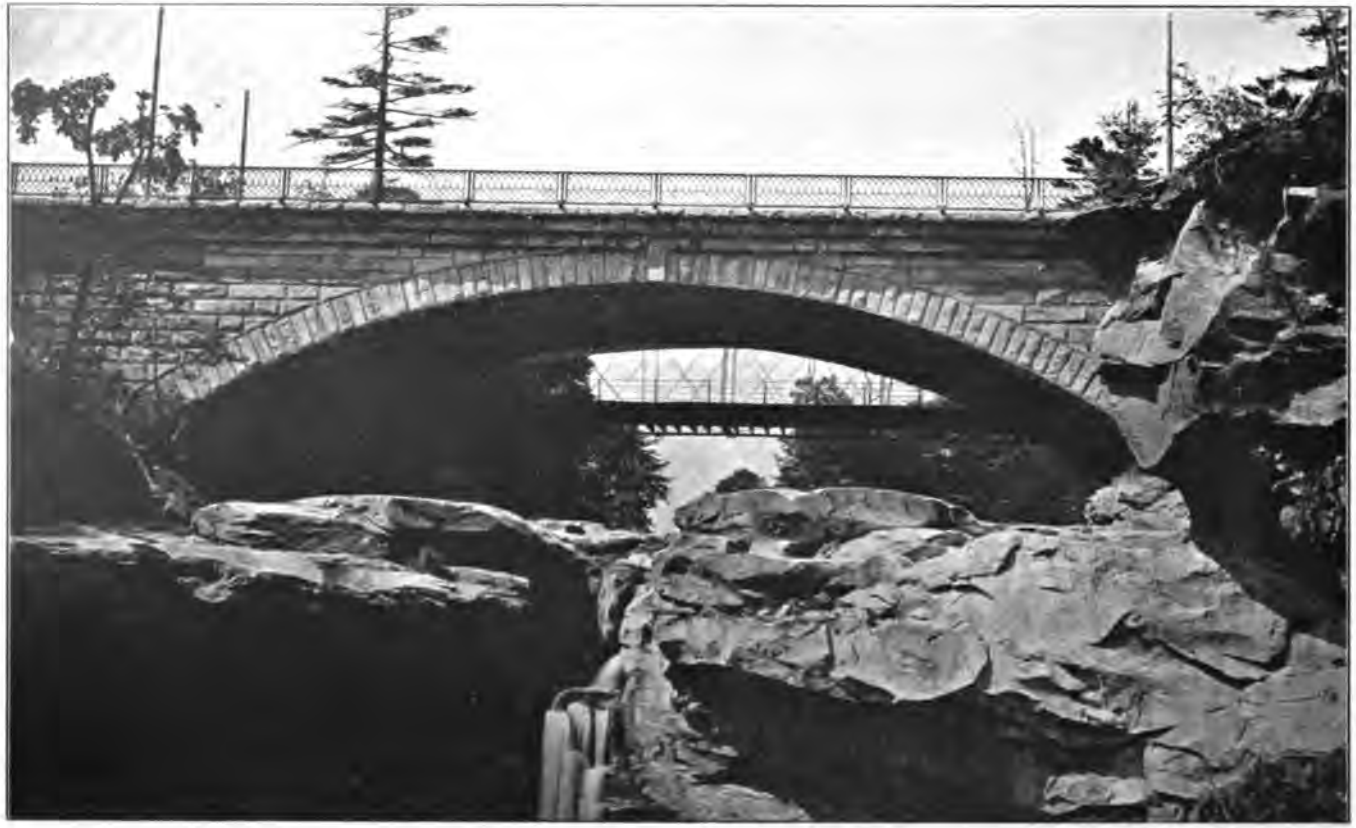
Messrs. Lee & Shepard, Boston, have just issued a most interesting piece of fiction by Henry Wood, entitled "Victor Serenus." The scene is located in that very dramatic period of the world's history, the Pauline era, and through graphic character delineation deals with the thought, customs, and religious systems of that time. Its aim is to draw a true and well-proportioned picture of the actual conditions, avoiding an overdrawn and debasing realism, so often employed for the sake of exaggerated contrasts. With unimportant exceptions, Paul is the only historic character, and those who have been privileged to read the advance sheets are of the opinion that the various dramatic and psychological situations which are depicted during his unique development are remarkable. Victor Serenus, and the other leading personalities that are employed, are representative creations. While the historic framework is carefully preserved, there is a wide range of the fancy and imagination in the movement, and a wealth of mystical, pyschical, and weird phenomena deftly woven into the fabric of the story. Love, adventure, romance, idealism, and magic are handled in action to combine entertainment, instruction, and profit. Mr. Wood's former books, which have passed through many editions, have been mainly philosophical, ethical, and metaphysical, (one of which, "Ideal Suggestion," has been translated into Chinese, and had a wide circulation in that empire), but in the present work the graces of the imagination stand out with great power in plot, action, style, and purpose. The book is a closely printed volume of five hundred pages, and good judges predict for it a great circulation and popularity.

The American Economist of March 25 presents in the form of a pictorial supplement an unique and interesting array of drawings and cartoons selected from the files of that paper for the past three years. The illustrations, several hundred in number, emphasize in a peculiarly forcible manner the strength of the doctrine of Protection as an active, living political issue, and also demonstrate with what vigor and aggressiveness this doctrine has been expounded by the American Protective Tariff League.

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STONE

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PRACTICAL POINTS ON COFFER DAM WORK



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most any kind of a hole. I kept the pump at work so that the diver could feel the suction and know where to place the sacks. It took four days with the diver to do this work. Then with some concrete placed inside in still water, with box made for the purpose. we pumped the water out without further trouble. The essential point in using sand bags is not to fill them too full, as there must be enough allowance made for the sand to adjust itself to uneven surfaces.

Lately, I met a man who used sand bags for purposes above mentioned, filled them up and of course failed to stop the leaks. It is useless to mention how many have tried to stop leaks and have failed. The above plan is sure and successful when used as described.

You have fully described in your columns the construction of coffer-dam used in the work done on the Arthur Kill bridge between Staten Island and New Jersey. I was in charge of the work for Boler & McGaw and will give you a few points not heretofore mentioned that may be of interest to your readers. Without going over your articles in detail I will give you from memory a few points regarding the difficulties we had to contend with.

The specifications called for the dams to be sunk and pumped out so that the Chief Engineer could examine the bottom before any masonry was laid. We commenced work on No. 2 pier by driving a sheet pile dam, tongued and grooved, in twenty feet of water, with a bottom of eighteen inches of clay and gravel mixed. (I was opposed to this dam. I wanted a double dam, but Mr. McGaw insisted that we could make a success of the above plan).

The driving of the sheet piles in the clay and gravel was very difficult. When completed we pumped out the water, after protecting the sheet piling outside with clay and stone. Taking one section in middle of dam we excavated it to bottom—the bottom was shale sandstone—got a ten-foot section clean and just about ready to place concrete when right in the middle of the section a part of the bottom lifted out, about two feet in diameter, and filled the dam in less than five minutes. We got a wrecking outfit with our own pump and tried hard to get the water out, but without success. We worked several weeks with divers concreting and using every means to get a bottom that would satisfy the Chief Engineer, but finally had to take the whole of our work out, dredge the bottom clean and build a double dam, concreting under water three to four feet before we could get pumped out. The facts arrived at were that the shale sandstone would not hold water, and the Chief Engineer had to give up his point of ever seeing the clear bottom. It was only after considerable controversy between Mr. McGaw and the Chief Engineer that the latter came to me as Superintendent, talked the matter over as to concreting under water, and my assurance to him that I could

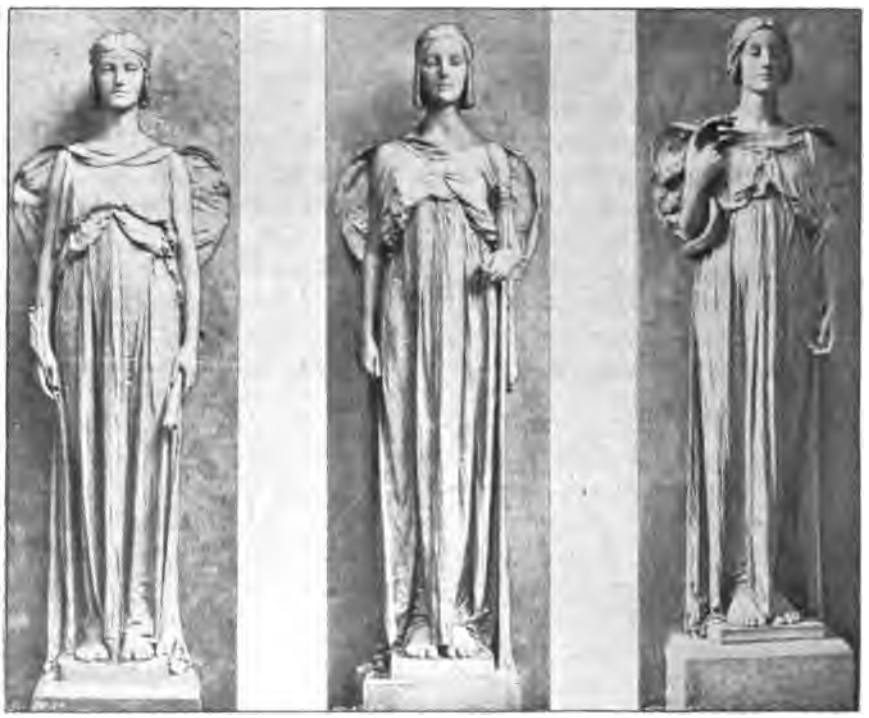
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taken to relieve it. He had made his way to Halifax and sailed thence to Liverpool, and while on the voyage had recovered his reason. Shortly after his return he began negotiations with the bank, and on Dec. 14, 1894, he entered into an agreement by the terms of which his indebtedness to the bank was fixed at $61,936, and it was stipulated that upon the payment of this sum in installments his property would be reconveyed to him. He paid several of the installments, and then, after investigation, discovered, it is alleged, that his various business enterprises had returned large profits while the bank held them, and he avers that the bank is indebted to him. The defense is a general denial, and the bank and the cashier say that Kilgour gave them releases. He says the releases were obtained by false representations.



WISDOM. ENERGY. COURAGE.

STATUES IN OOLITIC LIMESTONE ON THE SYNDICATE BUILDING, NEW YORK CITY, REPRESENTING THREE CHIEF FEATURES OF COMMERCE.

J. Massey Rhind, Sculptor.

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THE COFFER DAM PROCESS FOR PIERS - XI.

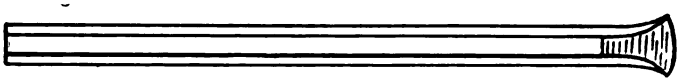


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must be established and the flow of the stream be obtained. A careful examination must be carried out as to the character of the river bed, and drillings made to learn the character and thickness of strata and the distance to bedrock, as well as the quality of it.

Borings to a small depth may be made by hand drills (Fig. 97a), which are operated by striking with a sledge and turned constantly to keep a round hole, or if long and heavy they will cut their way, if simply raised up and

(Fig. 97a)



(Fig. 97b)



HAND DRILL AND SWAB.

allowed to drop, with their own weight. The hole is kept partly filled with water and can be cleaned out with a small sand pump or with a swab (Fig. 97b) made from a stick slivered at the end, which will also bring up samples.

The Pierce steel prospecting augur is a tool, which can also be used without a derrick to bore test holes from 10 to 50 feet into loose soils or clay. Holes from 2½ to 6 inches in diameter can be drilled and samples obtained. The augur can be turned either by hand wrenches or by horse power.

Where the borings are to be of an extensive character a well-drilling machine can be utilized, such as shown in Fig. 98, and which can be run onto an ordinary flat-boat and towed to place.

The tools for drilling are a temper screw for regulating the height of the drill, a sinker bar to give the weight, steel jars and drilling bits. A sand pump is used to clean the hole and obtain samples; rope spears, rope knives and fishing tools to remove lost rope, tools and pebbles or other obstructions. The drill holes, unless through rock, are cased with iron pipe which can be withdrawn when the hole is completed.

The borings made by the Mississippi River Commission were very extensive and a special tripod apparatus (Fig. 99) was devised with a view to easy transportation and easy repair in the field. The tripod was 30 feet in height, with a strong head or cap, surmounted by a galvanized iron guide pipe 20 feet in height, in two sections, and held in place with guy ropes. The men operating the tools stood upon the triangular platforms which were attached to the legs. The casing was iron pipe in 10-feet lengths and screwed together so as to present a smooth surface, while the bottom was

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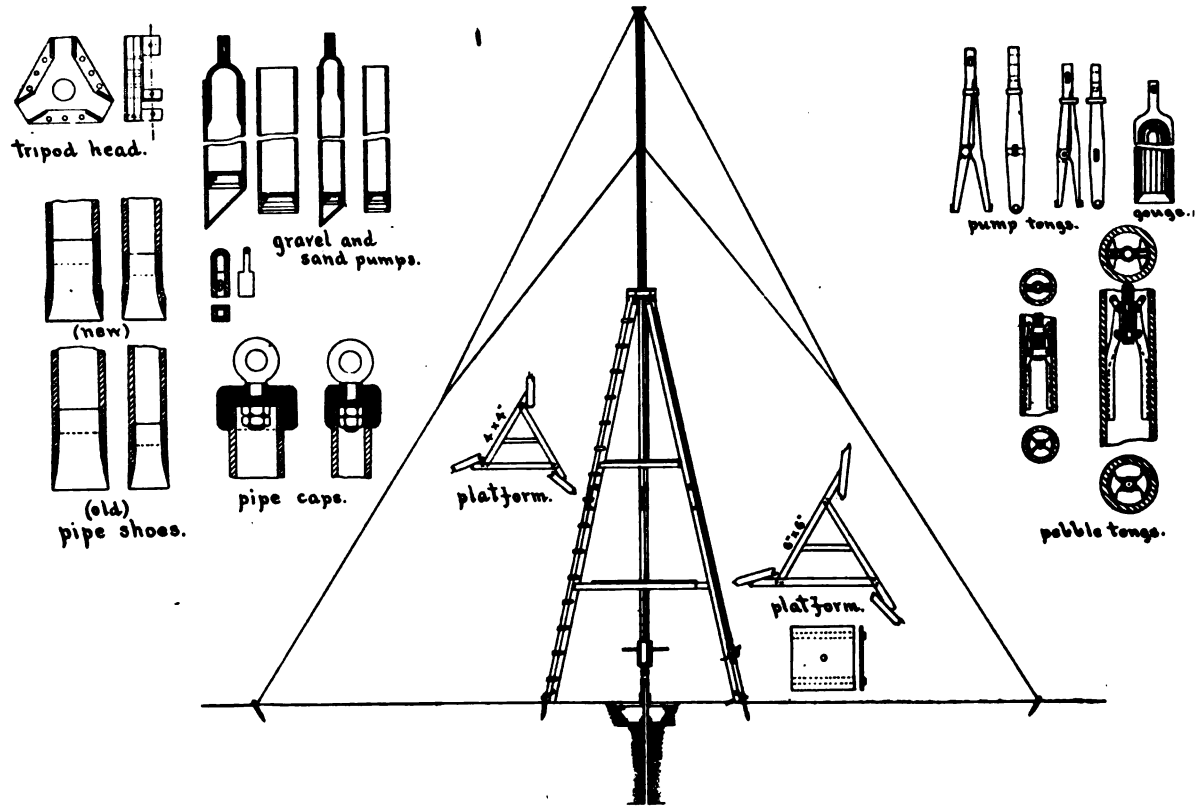


FIG. 99.—TEST BORING APPARATUS, MISSISSIPPI RIVER COMMISSION.

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[illegible] and requires great care and considerable experience. The pump was raised and lowered by means of the reel attached to one leg of the [illegible] steam from the surface noted from graduations on the pump [illegible]. When the boring is completed the tube is withdrawn by a system of [illegible] levers assisted by a set of differential blocks when necessary, as the [illegible] exerted was often as much as the strength of the pipe at the joints. The pump barrels were for use in removing large pebbles which would not [illegible] and for recovering lost tools or the [illegible] when in danger of becoming detached.



The above account is taken from the report of [illegible] Assistant Engineer, to which reference [illegible] further details.

When the examination of the site has been completed the borings finished the form of foundation may be decided upon due weight being given to good or bad [illegible] and to the available experience. [illegible] boring of good foundations be seen to be very expensive long spans must be adopted to reduce [illegible] in the river. But if inexpensive methods [illegible] with more piers may be used.

The length of span for a least cost of structure [illegible] to be decided when the cost of [illegible] was made equal to the cost of piers, and [illegible] certain capital the weight be approximately [illegible] a very neat [illegible] Mr. [illegible] Consulting Engineer was published in the Engineering News of [illegible]. The total length of the [illegible] was represented by [illegible] the number of spans by the length of one span in feet [illegible] by the [illegible] and [illegible] the cost of piers [illegible] by the total cost of the structure and [illegible] are constants.

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differential coefficient equal to zero the cost of one pier is obtained, which will make the total cost of the structure a minimum or

$$p = \frac{s^2 - (ab + 400)}{b} \quad (3)$$

Or when the cost of a pier has been estimated, the economical length of span may be found by a transposition of the above formula:

$$s = \sqrt{ab + 400 + pb} \quad (4)$$

The values of a and b may be found by substituting in equation (1) computed values of the cost of a number of spans for an actual loading. Values of s, p and c, may then be computed and tabulated for spans from 100 feet upwards, as formula (1) is not true for shorter lengths.

In an actual calculation for B. & O. R. R. loading, which consists of two 125-ton engines followed by a 4,000-pound per lineal foot trainload, a was found equal to 1950 and b to 3.05. Assuming a case where the length of the bridge is 700 feet, where the height of the piers will average 25 feet, and the average cost of piers and abutments be $4,310, then from formula (4) the economical span will be found equal to 140 feet. The total cost of the structure will be found, by using formula (1), and the cost of piers as above, to be $59,700. While with only four spans of 175 feet, the total cost would exceed $60,800, and with six spans of 117 feet, would be about $61,400.

Should there be any doubt as to the ease of obtaining foundations, the prudent engineer might deem it wise, however, to build the four-span structure and avoid the risk and delay which would be caused by another foundation in the river.

After deciding upon the number and location of the piers, they must be designed with reference both to their being as slight obstructions to the water as possible and to their architectural appearance.

The design of piers has been given particular attention by Geo. S. Morison, Consulting Engineer, whose work on the bridges across our great rivers is notable for its strength, simplicity and finished appearance. In a recent lecture he describes the process of the design of some large piers: "Fourteen years ago I had occasion to design a bridge pier for a bridge across one of our Western rivers, and I tried to make an ornamental pier. When the plans were completed I did not like them. One change after another was made, all tending to simplicity. Finally the plans were done. From high water down, the pier was adapted to pass the water with the least disturbance; it had parallel sides and the ends were formed of two circular arcs meeting. Above high water the ends were made semi-circular instead of being pointed. The pier was built throughout with a batter of one in twenty-four. A coping two feet wider than the body of the pier projected far enough to shed water, and the projection was divided between

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the coping and the course below. Another coping with a less projection surmounted the pointed ends where the shape was changed. It was as simple a pier as could be built, and in every way fitted to do its duty. I had started to make a handsome pier. The pier that was exactly what was wanted for the work, was the only one that satisfied the demands of beauty. Forty-three piers of precisely this design (no change having been made except in the varying dimensions required for different structures), besides eight others in which only the lower parts are modified, are now standing in eleven different bridges across three great Western rivers. In designing a pier it must be remembered that the portion of the pier below the water has more to do with the free passage of the water than that above water. In a deep river the model form of the pier should begin near the bottom of the river and not at low water. Many rivers in flood time carry a great amount of drift. A pier like that which I have described catches but little of this drift. If, however, a rectangular foundation terminates but little below water, that foundation may both disturb the current and catch the drift."

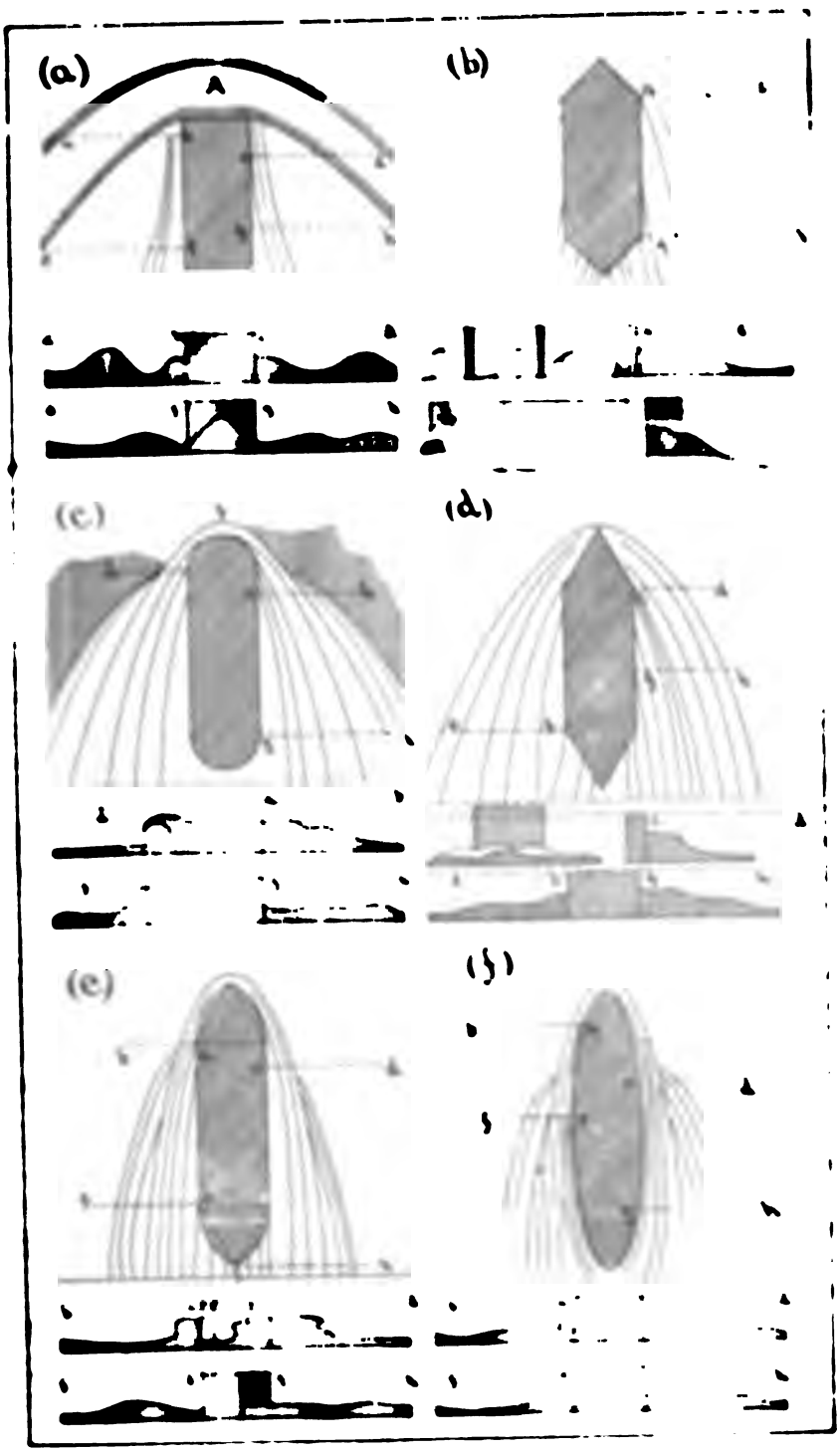


FIG. 102.—RUSSIAN PIER, RUSSIAN STATE RAILWAYS.

The piers of the Omaha bridge, which carries the Union Pacific across the Missouri river, are illustrated in Fig. 101, and were constructed as described and are among the most beautiful piers in this country.

In Europe, where money is more lavishly expended on great works of engineering, piers of great architectural beauty are much more frequent. The Russian Government railways, which have seemingly been constructed without regard to expense, have many beautiful examples of bridge masonry and piers; the view of one of them (Fig. 102) with curved ends, shows the elegant and massive character of the masonry. While extremely

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simple in design, the cut stone coping and the moulded corbel course below give it a finish which cannot be surpassed.

The design of piers for strength and stability is fully treated in Baker's Masonry Construction, but some experiments, which were made with reference to the proper form to occasion the least resistance, will be quoted at length from Cresy.

The introduction of piers into a channel gives rise to a great disturbance in the velocity and flow of the water. Rapid currents are formed which cause the bed of the stream to become washed and the foundations to be endangered; eddies are created which are likewise undesirable, and it becomes necessary to adopt such a form for the ends of the piers that the disturbance to the flow shall be small.

M. Bossut, in a French work on jetties, thought to have solved this problem by mathemathics, his conclusion being that the starling should be triangular, the nose being a right angles.

M. Dubuat, in his "Principles of Hydraulics," gave another solution which was more nearly the truth, in that he arrived at the conclusion that the faces of the starling should be convex curves. The true form is most nearly reached when these curves are tangent to the sides of the pier, and further than this, regard must be paid to giving enough solidity to the starlings to protect them from ice and drift. A happy medium would seem to be reached, by making the curves with a radius equal to one-sixth of the circumference, described on the sides of an equilateral triangle.

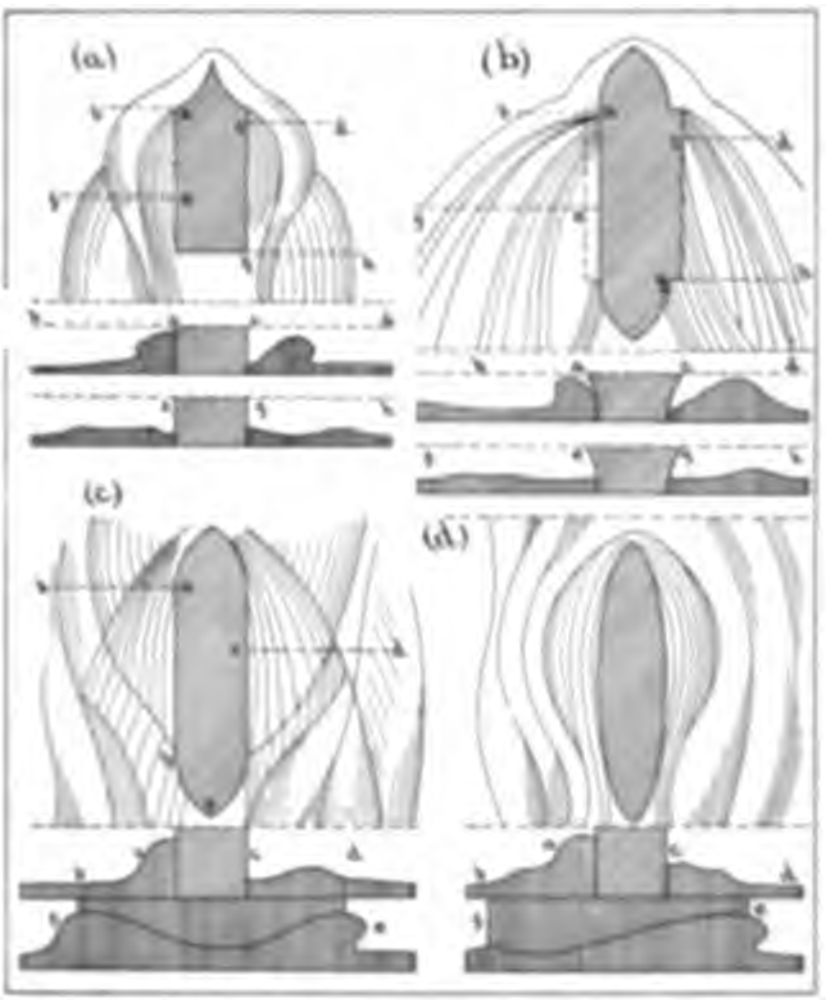
Experiments were made with models of different forms, which were placed in a rectangular canal between boards of 50 centimeters in length, in which the water flowed about 40 millimeters in height, the models being 15 centimeters in thickness. By means of a fall, the water was given a velocity of 3 meters 9 centimeters per second, the contraction, eddies and currents being carefully measured. The first experiment was made on a pier (Fig. 103A) with rectangular starling. An eddy was formed before the pier 34 millimeters high, in a nearly circular band A, falling nearly vertical at the corner. There were two other currents along the faces of the pier, the height of which can be seen in the cross-sections.

The second experiment (Fig. 103B) was with a triangular starling, the nose being a right angle. It formed a less obstruction than the square end, but the fall at the shoulder was as deep and more dangerous, while eddies were formed as seen in the sections.

The third one (Fig. 103C) had a semi-circular starling. The eddy was not so wide, but nearly as high.

The fourth model had a triangular starling, with an angle of 60 degrees at the nose. (Fig. 103D.) The eddy was less, as was also the fall at the shoulder.

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The eighth (Fig. 104B) was of the same form as Fig. 103E, but the water was supposed to mount the springing of the arch.

The ninth and tenth experiments (Figs. 104C and 104D) were on the same forms as Figs. 103E and 103F, but the current had a velocity of 4 meters 87 centimeters per second, such as a river would have in its overflow. The eddy (Fig. 104C) rose to nearly twice the height, as was the case with the lesser velocity, and while there was no fall, the inclination formed along the faces was more rapid.

The effect with this velocity on the elliptical pier (Fig. 104D) was similar to the lesser velocity but more marked. It may thus be concluded that the elliptical section offers the least resistance to the current and occasions the least contraction, while the form with convex starling comes next, and of piers with triangular starlings the one with the 60-degree nose is the best.

Where ice is to be provided for, the nose is often inclined to allow large cakes to mount it and break in two, without doing further damage. For any large or important structure, the design of the piers should receive a great deal of study, and be designed not only with reference to their theoretical form, but with reference to the form of pier which has shown the best results practically and has been found to be best suited to the velocity of the stream in which they are to be built, and to best withstand the drift and ice that may be met with, giving at the same time all the consideration possible to the architectural effect and to the harmony with the entire structure.

Charles Evan Fowler.
Mem. Am. Soc. C. E.

[THE END.]

OÖLITIC STONE PRODUCTION.

THE following summary of the statistics of the production of Bedford oölitic limestone for 1897 may be of interest to your readers: The production in cubic feet for 1897 was 5,382,589 as compared with 5,455,589 for 1896. The value of the same was $1,344,158 as compared with $1,209,632 for 1896. On the face of it, this would seem to indicate a substantial advance in prices, but for the benefit of those of your readers who can't admit that any advance is possible under the present regime, it may be said to be in part due to the larger amount of stone sawn in home mills.

The capital invested in quarries and mills is $3,363,400. The number of quarries equipped with machinery is forty-two, of which twenty-nine were in operation, more or less, in 1897. The number of mills is thirty-three, of which twenty-five were in operation in 1897. The average number of hands employed is 1,739. This does not include stone-cutters. The prospects for 1898, according to the best information at hand, indicate an increased production with prices about stationary.—C. E. Siebenthal, in Bloomington Telephone.

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of the United States. Although the difficulties in the Welsh quarries have been settled, the American producers seem to be holding the trade they have gained, and while prices have not been all that might be hoped for, the quality of our slate is such as to give satisfaction and thus continue to be demanded by the foreign trade.

Improvement in the demand for the luxuries of the stone industry, *i. e.*, monuments, interior decoration, polished work of all kinds, seems to be fairly as marked as it is in the case of stone which supplies the absolute necessities of building. Considerable enterprise has also been shown during the past year in opening up new quarries and in inaugurating new departments and improvements in methods of working.

MARYLAND BUILDING STONES.

PROFESSOR GEORGE P. MERRILL, curator of geology in the United States National Museum at Washington, D. C., a recognized authority on the natural structural materials of the country, in conjunction with Prof. Edward B. Matthews, of the Johns Hopkins University, under the auspices of the Maryland Geological Survey, have completed the manuscript for a valuable volume upon "The Building Stones of Maryland," which will form a part of the forthcoming second report of the State Geological and Economic Survey. The volume will be the first comprehensive survey of this important branch of Maryland's industrial wealth. It represents nearly two years of painstaking labor on the part of the authors and numerous other geologists who have assisted.

In their description of the prominent areas the authors show that all of the quarries of the state of any importance are situated in the northern group of counties from Cecil to Garrett. Each of these counties has deposits within its limits extensive enough and of sufficient excellent quality to support one or more good-sized industries.

Summarizing the details of the entire report we glean the following facts concerning the stone industry in the different counties:

In Cecil county the principal building stone is granite. Along the shores of the Susquehanna river rise bold cliffs which furnish ideal opportunities for quarrying. The quarries at Port Deposit furnish material for many of the first-class jobs throughout the country. The ease with which the stone may be loaded either on cars or schooners adds greatly to its value. It would be an important deposit in any case, because of its beauty and the ease with which it is worked. The Port Deposit granite appears so widely in Baltimore's residences and public buildings. It is a light, pleasing gray stone, mottled with more or less parallel flakes of black mica. At Frenchtown the quarry is much younger, but it bids fair to become an established and extensive enterprise.

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in 1847. He called attention to the superior quality of the material, and remarked upon the peculiar forms which the rock showed in the quarries. The rock here is a black mica granite, varying from light to dark gray in color, of medium texture, but exceptionally well suited to general building purposes. It is found in the Fidelity Building, at Charles and Lexington streets. Somewhat further down the Patapsco, near Ellicott City, on each side of the river, are smaller quarries of granite and gneiss. It was from these quarries that, in 1812, stone was hauled for the Catholic Cathedral, in Baltimore, in teams drawn each by nine yoke of oxen, as told in a paper by Robert Gilmor, Jr., published in 1814.

Other good deposits of granite are scattered through both counties, among which the most important is that at Guilford, a few miles north of Annapolis Junction. Here a beautiful, fine-grained rock, well adapted to monumental requirements, is quarried. This industry is handicapped by the lack of transportation facilities.

Scattered through Frederick and Carroll counties the survey has found frequent exposures of marbles and limestones, which may be of value as building stones. Most of them, however, are so fragile that little successful quarrying has been carried on. Still, the stones are so beautiful that some means should be devised by which these marbles, as beautiful as the Tennessee or Sienna stone, may be utilized. The sandstones of both counties are capable of wide development whenever a demand is created and transportation facilities provided. Most of the quarrying at the present time is in small openings, or where the operations are on a larger scale. The material is used almost entirely for fertilizing purposes, from which a large industry has developed. A notable exception is the extensive quarrying of Potomac marbles, or "calico rock," at Point of Rocks. This material first came into notice through a Baltimorean, who suggested that this rock was just the thing for the pillars in the Hall of Representatives, at Washington. His suggestion was adopted, with the result that this almost unknown stone received the most prominent position among those represented in the construction of the interior of the Capitol, at Washington. The stone is now quarried for interior decoration, in cases where the great range in color and the irregularity in texture add to the beauty of the mosaics in which it is placed.

Montgomery furnishes sandstone of such a nature that it supplies far more than all local demand. At Seneca Creek there is quarried a light reddish-brown sandstone of fine and even texture, which is well adapted to all kinds of building and ornamental work. This is the stone which has been pronounced by a leading expert to be "one of the best Triassic sandstones in the country." This sandstone has been quarried in a more or less systematic way since 1774, when it was used in the construction of the old

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SAW A SAW MILL SAW.

WE print the following from the St. Paul Pioneer-Press because it is "mighty interestin' readin'," and not for the information it conveys to most of our readers, who probably know more about the practical oporation of a stone saw mill than "the feller who built it," but lack the "poetic fancy":

"A marble saw mill! The expression makes one think of the buzzing drone of revolving saws behind Corinthian columns; of the fresh odor of yellow pine in some Grecian temple where incense once floated upward to the gods. A saw mill for marble! That's different. But, to most people, it's equally improbable. Why not a drawknife for granite, a gimlet for diamonds? But a saw mill for marble it is, a mill that saws accurately through marble timber wider and thicker than any pine timber drawn by Minnesota from the glittering, steelly tooth.

"The marble saw mill is in St. Paul. It is already one of the local 'sights.' Two days ago it was established at the northeast corner of Park and Aurora avenues. The marble timber that the saw mill saws is crystal, snowy timber for the new state capitol.

"The first block of marble was placed under the saw Friday. With this block preliminary trials were made. But the saw required frequent adjusting. And no steel shot had yet been received to assist sharp sand in assisting the saw. Therefore the mill had not yet cut into three pieces yesterday afternoon this great block of stone twelve feet long, six feet wide and six feet thick. But when fully prepared, the 'slow' saw now in operation will cut through six inches of stone each hour and will separate within one day a block like that just mentioned. There is, besides, a 'high speed' saw, to be in place Tuesday, which will cut fourteen inches of marble every hour.

EVOLVING ART.

"The marble saw mill is at the north end of the large temporary building just completed by the Butler-Ryan Company, contractors for erecting the superstructure of the capitol. The black smoke from the furnaces of the engine at this mill flutters prominently on high—a notable symbol of industry evolving art—above the high hill at the northern center of St. Paul's amphitheater. The smoke waves over a triangular, one-story building of unpainted pine thatched with inky, tarred paper.

"Hunting the source of a grinding noise within the building, the visitor hears next the splash of water as from a fountain. He discovers the marble mill and the big marble block that the mill is dully grinding. He sees the block, a rusty, yellowish-white mass almost as large as an upright piano. It

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gravel, ice, once in the glacial period, cut deeply out what now are velvet valleys between the roughest mountain crags. Sooner or later, of course, as the visible mill grinds on with godlike slowness, both steel and shot become too crushed, too worn, for further use. Until that time, however, the gray and yellow grains discolor the broad streams of water that pour down upon the marble, over the edges of the block, and out of the long fissure to gather in a muddy pool within the wooden tank below the block. From here the water, sand and shot are pumped continually back into the pipe that discharges it, an endless chain, liquid, yet grinding, into the warm embrace of the collaborating saws.

"Three saws were used yesterday to divide the marble block in the middle, and at the same time to cut away the two rough sides. But the number of saws can be increased to six, which can be adjusted at any point within the saw frame. Blocks can be sawed as large as 13x7x7 feet. The 'high speed' marble saw will be placed alongside the low speed saw, and will perform its sawing, if more rapidly, after much the same fashion.

"The low cars conveying the marble block beneath the saws are taken into the building from a side door and along a track which extends out into the receiving yard. This yard at the edge of the street receives its big blocks from low, muscular trucks, the little wheels of which have tires six inches in diameter. The block is raised from the truck by means of the kindly assistance of a big derrick, 65 feet high and its 54-foot boom. The derrick, when it's quite well, can raise 40,000 pounds from the floor with one hand. It was lifting a little rock weighing 24,000 pounds yesterday afternoon, and was swinging it about with graceful, 'strong-man' gaiety.

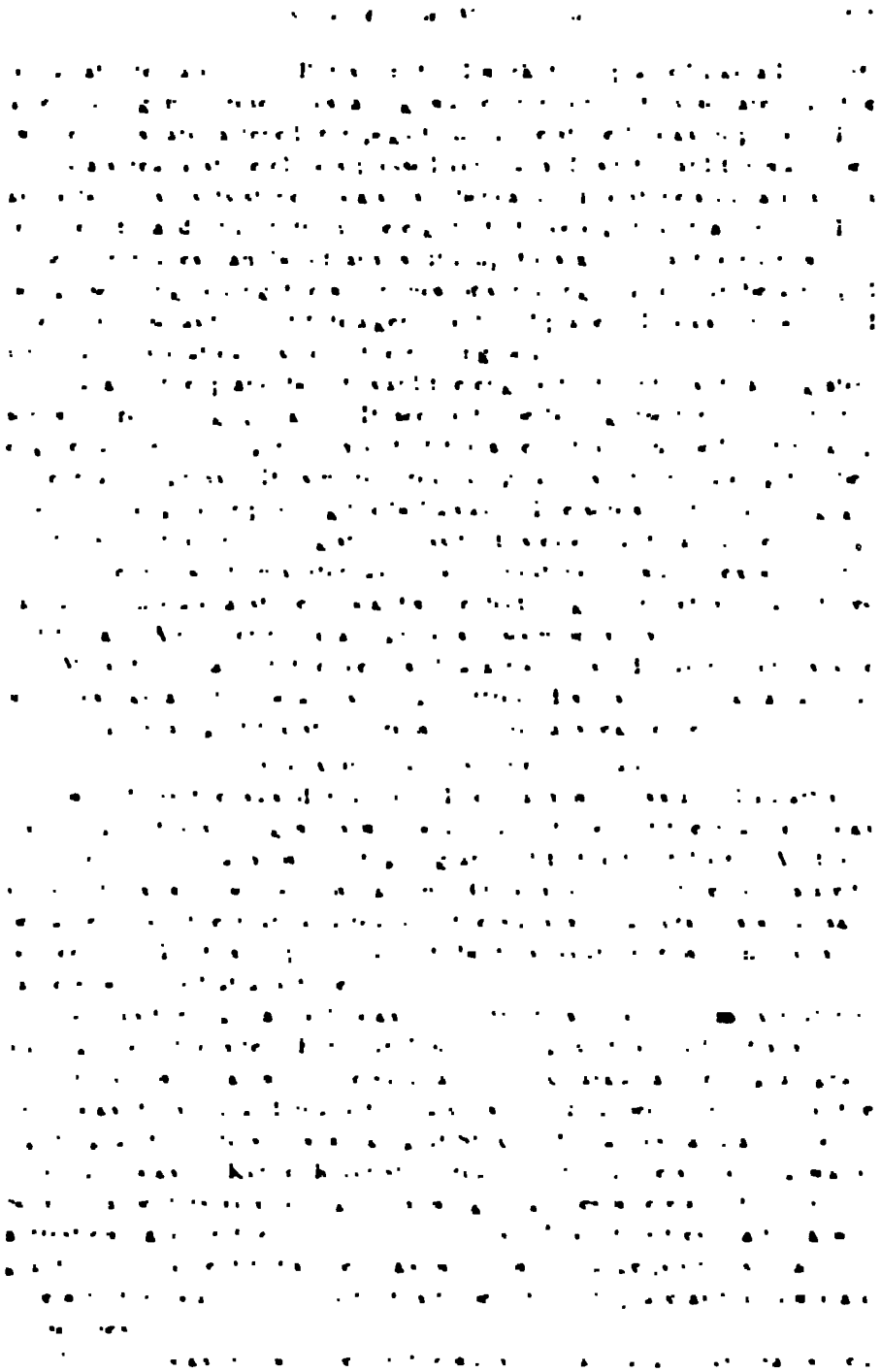
"A half-dozen of these stones are already on hand. They are not exactly Pentelican in their appearance. They are yellow and striped and rusty from exposure to the weather and the dust since they were shipped, as stenciled, from the Southern Marble Company, Marble Hill, Ga. But most of the discoloration will disappear when the marble is finally cut. It will not show a polished surface in the exterior walls. The lower story will be finished with

VERTICAL FLTUINGS,

six to the inch, which will reflect light rays and increase the stone's brilliancy. The upper stories will have a smooth but dead finish, that will present the most desirable effect from a distance. Wherever the blue streaks in the marble are too pronounced, they will be kept out of sight by cutting the stone between them. But a mere blue tint, common to much of the Georgia marble, will, the architects say, soften the glare of absolute white, and will increase the brilliant beauty of the walls, like indigo on a shirt front, violets on a spirituelle blonde.

"More noisy than the saw mill is the planing mill. It was planing yes-

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of the mortar's freezing over night. Yesterday half a dozen stone-cutters were working happily, over blue limestone, in their shirt sleeves. But even in St. Paul the nights are often cold after March 1. So, as a good joke on Jack Frost, the new capitol will assume its first marble block April 1, when Jack is far away in Klondike."

ELEMENTS OF STRENGTH IN BUILDING STONE.

AT the last meeting of the Mining and Metallurgical Section of the Franklin Institute, in Philadelphia, Prof. Alexis A. Julien, of Columbia University, New York, delivered a lecture, in which he said that a general dissatisfaction with the methods of trial and mistaken ideas of economy of time and cost have led to the neglect of preliminary examinations of stone to be used in important construction. The results are shown in the injury and mutilation of many great buildings throughout the country, sometimes even before their completion. The dissatisfaction with the methods of trial is partly due to the lack of association and mutual understanding between the professions of the architect, engineer, chemist and geologist. A revision of the methods is called for, which must be first based on the elementary characteristics of stone itself, as revealed by the investigations of modern petrography.

The strength of a stone is theoretically its power of resistance not only to compression, but to all tearing asunder of its particles by forces of frost, weathering, etc. Compressive strength and durability, however, are not synonomous, and their approach occurs only in certain kinds of stone, and is then largely modified by climate. Nor does the strength of stone depend to much extent upon its actual mineralogical constitution, though there is need of investigation of many physical characteristics, crushing strength, etc. The chief elements of strength may be concentrated in four classes:

1. Interlockment of grains, of which three stages occur, irregular aggregation and with poor consolidation; parallel sorting of grains, and dovetailing or interpenetration. The last is most thorough in the crystalline stones, and on it the weight, taken in mass, depends far more than on the specific gravities of the constituent minerals.

2. Coherence between the grains, effected in two ways: First, cementation, mainly of the fragmental stones; there is much variety in the distribution of natural cement. The reasons for the superiority of the American oolites to the Caen stones of Europe are found in the better cementation; also, the special excellence of sandstones with silicious cement. The evidences of cementation even in the crystalline stones should be noted, and there should be a thorough investigation of the nature and deposits from "quarry sap." Secondly, surface or capillary adhesion between the minute

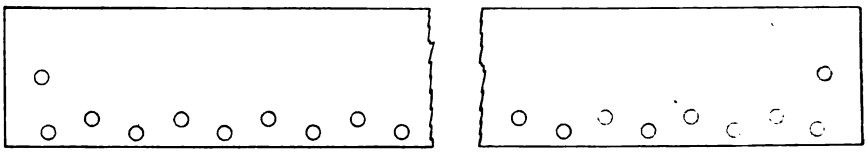
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of unemployed members of trade unions (with a mean membership of 460,267) making returns was 3.5, compared with 3.4 in 1896. If, however, the two halves of 1897 be separately considered, the percentage of unemployed for the first half was only 2.7, while for the last half it was 4.2. The mean for the ten years, 1887–1896, was 5.1.

HOLES IN SAW BLADES.

PUTTING holes in saw blades to increase their usefulness is a good idea and well worth the trial of managers of stone saw mills It will cost but little to try and demonstrate its practicability. Where it has been tried it has proved valuable on soft stone; also even on as hard a stone as bluestone. The first row of holes are punched as near the lower edge of the saw blade as possible, at a distance of from eight inches to twelve inches apart, the next row being punched midway above the first, so that when the first holes wear away the second row come in use. The second row of holes should be punched so they will alternate with the first, as they then do not



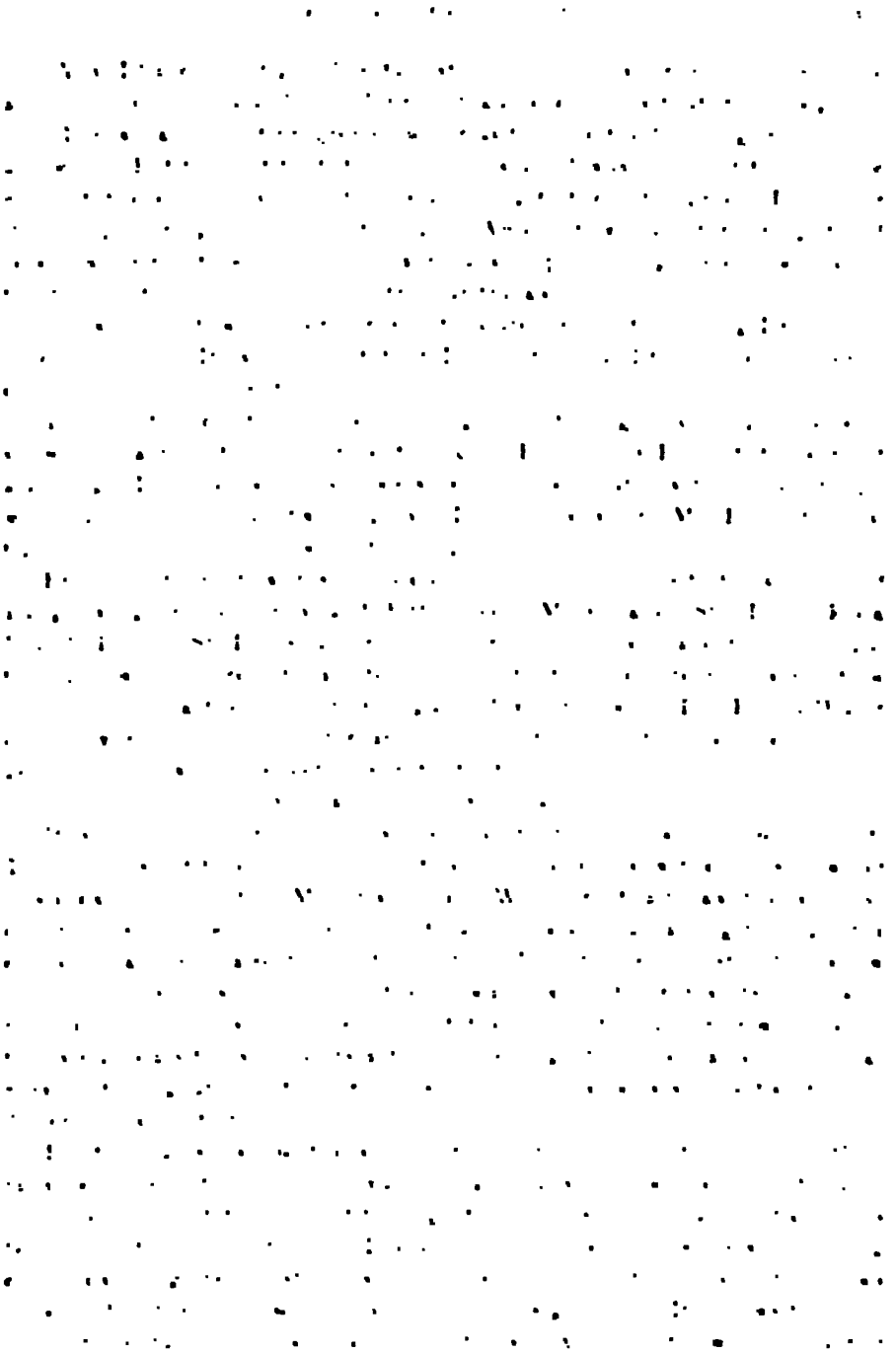
weaken the blade, and they also can be put near enough to the edge so they will be broken open at the time first row wears out. A three-quarter-inch hole is a good size, but the holes can be the same as those put in each end. to hold the saws in place, and can be put in at the same time with but little additional expense. Two rows of holes are all, perhaps, that should be put in an ordinary size blade, as more are apt to weaken the blade when it becomes worn. The theory is not that the holes form a set of teeth and thus cut, but they cause the sand, crushed steel, chilled shot, or whatever is used on the gang, to work more freely under the blades and do more work.

SKYSCRAPERS DOOMED.

IS electrolysis going to destroy the high buildings? A report from excellent authority says that it has begun its attacks upon the foundations of Chicago's steel buildings.

Suspicion has been felt for some years that the peril from electrolysis was of the gravest character. Any uncertainty as to the existence of the possibility of foundations suffering from electrolytic action is definitely settled by the report of quiet investigations recently made by General William Sooysmith. The report of his investigations into electrolysis in foundations is as follows:

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into the line of a conductor leading toward the current's destination, which is the initial point of its circuit.

Insulation is claimed to be an existing protection for steel foundations, the so-called insulator being the cement in which the steel work is imbedded. This is another empty claim, for cement, while not a good electric conductor, is not an insulator by any means. One of its essential elements is unslacked lime, which is not only a conductor, but, much more important, is one of the greatest known absorbents of moisture. The subsoil under Chicago, it is unnecessary to state, is never dry. The unslacked lime, acting according to its distinguished principle, must inevitably draw in dampness from the surrounding earth, and thus keep saturated the pores of the composition of which it forms a part. Electricity will find its way through any moisture-containing material. Even though the sand and other elements of cement were non-conductors, therefore—which they are not—steel foundations would be electrically exposed.

HOW THE CURRENT WORKS.

But argument as to the conductivity or non-conductivity of cement, after all, is idle for purposes of the point in hand. The current need not penetrate the cement in order to reach the steel, nor need it penetrate any crevice in the cement. It can come up underneath and pass directly from the clay to the steel beams or rails in the formation piers, thence to the columns. Following its rule of choosing the easiest channel for circulation, that is the line on which it will work. The dampness always existing in the strata of soil a few feet below this city's surface suffices to aid the electrolytic decomposition of foundations quite as well as of water and gas pipes.

One hardly appreciates the gravity of the threatened calamities until he considers the immensity of the life and property interests involved. The largest buildings in the city and the greater part of the most costly are of the construction which, by a single irony of fate, is most endangered by the secret depredations of the unruly servant, electricity. The Fisher, the Masonic Temple, the Ashland, the Marquette, the Tacoma, the Stock Exchange, the Woman's Temple, the Reliance, are a few of the many skyscrapers that have frameworks and foundations of steel. The number of people who spend six days a week in the Monadnock alone is about 5,000. Thousands more are daily occupied in the Masonic Temple, the Stock Exchange, and each of many other vast piles of metal and mortar. The effect upon the personal safety of the occupants of a steel building in the event of a sudden settling under one or more of the columns can only be surmised. Perhaps the building's end would come in the form of a settling sufficiently gradual to allow time for escape; it is easy, however, to conceive that the rigidity of the building would produce a contrary effect.

Whatever form the final consequence of unchecked electrolysis may

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evidently made a very careful and painstaking study of this uninteresting subject. The trouble may come from the clay, the water employed during the various stages, the ashes and pyrites of the coal, and from the mortar. The pyrites of the coal may certainly cause mischief, especially because modern practice is in favor of continuous ring kilns, which work with plenty of oxygen; while in the old periodical kilns the atmosphere was frequently reducing, so that little sulphuric acid was formed from the SO_2. The presence of sulphuric acid, we learn incidentally, favors the production of colored bricks, for it decomposes the yellow iron-lime silicate. But the author attaches more importance to the pyrites in the clay, and to chemical interaction between brick and mortar. He has very fully gone into this inquiry. He found *e. g.*, that certain bricks remained quite smooth when piled up, and become soon covered with efflorescences when used with a mortar which proved perfectly harmless to other bricks. Almost all clays contain pyrites, which, in the presence of magnesia, give rise to immediate efflorescences; in the presence of lime, only after decomposition with the alkalies of the mortar. That the sulphates are the chief culprits he established beyond doubt. We may mention that the case is different in lavatories where ammonia is constantly liberated and slowly converted into nitrates. As a remedy, Günther suggests to admix baryta, as carbonate or chloride, which would bind the sulphuric acid. The sandstone blocks of the handsome new Town Hall at Hamburg suffer from this trouble.

BLUESTONE DEALERS MEET.

A MEETING of the wholesale dealers in bluestone was held at Kingston, N. Y., on Friday, April 15. There were present Hewitt Boice, Julius Osterhout, B. Taylor Harris, J. J. Sweeney, James T. Maxwell, F. L. Rogers and E. Risley.

The meeting was called to consider the demands made by the Bluestone Cutters' Association for additional wages and of the Mill Mens' Union for additional pay and less hours. After a full discussion the following preamble and resolution was adopted:

WHEREAS, The Bluestone Cutters' Association have demanded increased wages over those paid in 1897, and the Mill Men's Union have demanded increased wages and less hours, and

WHEREAS, The present condition of the bluestone business will not warrant any increase in pay over 1897, therefore be it

Resolved, That on the 30th day of April, 1898, our mills and stone-cutting works be closed, and that no further work be done without the unanimous consent of all the parties hereto, and until a satisfactory arrangement can be made with our employes.

The meeting was entirely harmonious and the resolution was passed unanimously.

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PRACTICAL STONE-CUTTING VI



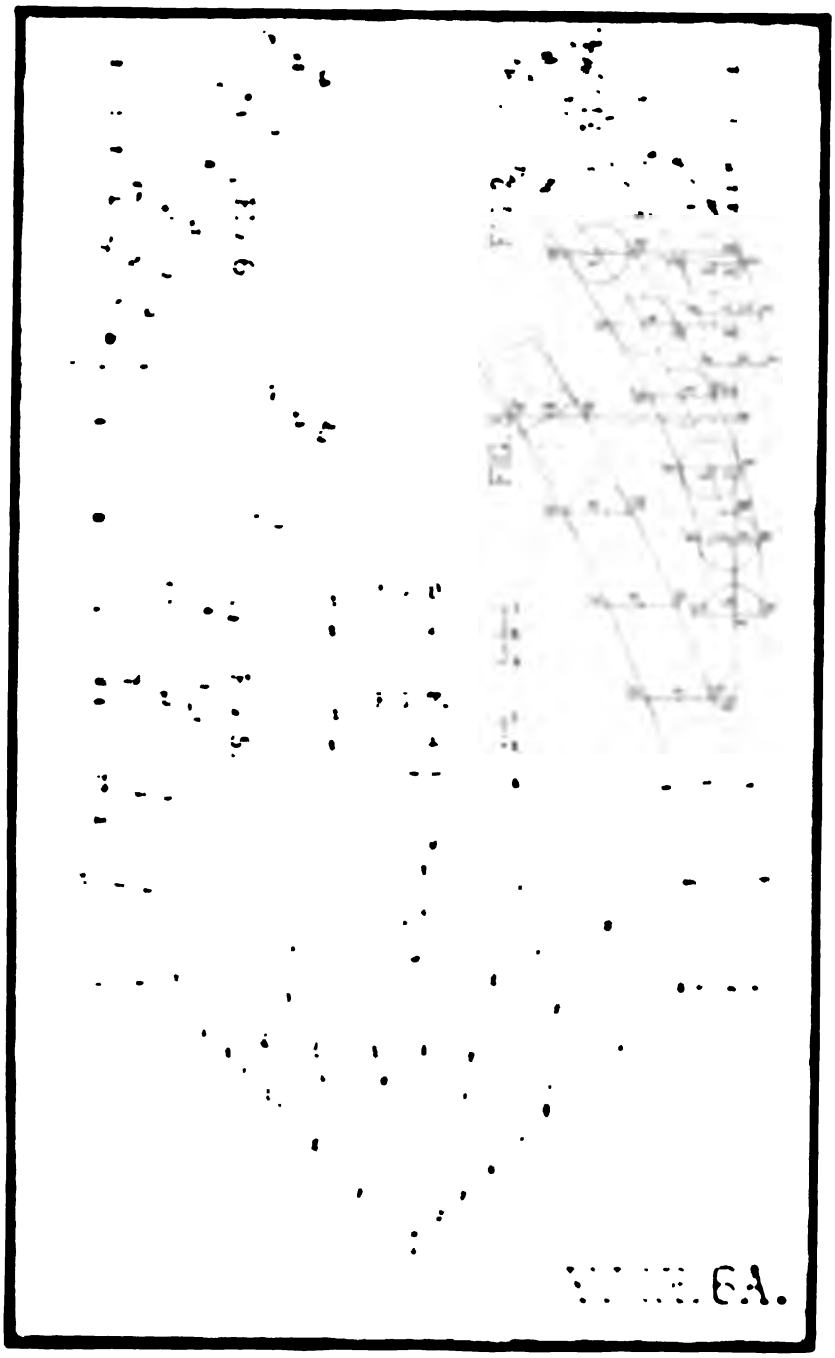
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the center and concave curves have diminished in thickness when compared with that of the convex curve mould, that of the concave diminishing fully one-quarter of the width as given in 10′—10 of Fig. 3. Let us take as a supposed problem the coping to joint at the projections N—V, H—P, Fig. 1, against straight coping inclined at an angle equal to that of G—A, of Fig. 2, and whose thickness equals that of 10—10′ of Fig. 3 (say twelve inches). Then if the coping be formed to the direction given by the moulds, Figs. 3 and 4, the inside face will be too thin by over three inches. This is shown in X—X′, of Fig. 4, which represents the thickness of the straight coping. When in charge of work the foreman may perhaps be called upon to "get over" a want of a quarter of an inch, but we think a shortage of three inches is rather too great a task for the ordinary man to circumvent. With these remarks and a study of the diagrams we think the student will clearly see the utter impossibility of cutting stone correctly with the aid of such patterns.

Now a few words respecting the geometrical principles made use of at these developments. Firstly, the radials O—V—N, O—U—M, etc., of the plan are taken to represent the horizontal traces of vertical planes. The vertical traces of these planes are represented in the perpendiculars N—1, M—2, etc., of the diagrams. These vertical planes are from the conditions of the problem, intersected with horizontal planes parallel with the plane of the plan. The vertical traces of these plans are projected respectively in the horizontals 1—1, 2—2, etc., of Figs. 2, 3 and 4. The points 1′—1, 2′—2 are respectively the vertical projections or elevations of the points V—G—N, U—F—M, etc., at the supposed level radial elements of the surfaces.

Now to construct a set of face moulds which will give in a systematic manner the proper direction at which to form the coping so that when in its finished state it will be of the same thickness at the inside as at the outside face. In Figs. 5 and 6 set off N—H and V—P, equal respectively to the stretchout of the convex and concave curves of the plan. At H and P erect verticals equal in height to the total rise of coping. Now joining A—V, A—N gives the center line of the patterns. With the half thickness of the coping as the radius, and A—N, A—V as the centers, describe arcs as shown. Tangent with these draw 5—1, 6—2, which gives the top and under lines of the moulds. Now to project lines which will give the direction at which to form the normal joint surface. At the base line set off P—G′ and H—G, equal to the stretchout of the center curve of the plan. Join A—G, Figs. 5 and 6; then lines as 1—2, 5—6 square with A—G will give the joint lines of the moulds. If a joint surface be desired at the center point D, Fig. 1, by drawing 3—4 through D of the moulds, square with A—G, the joint line may be obtained.

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As may be noted the joint surfaces intersect the top and under surfaces of the coping in horizontal lines; that is, the arris of the joint surfaces will be level when the coping may be placed in its proper position at the wall. This is shown in the horizontals 1—1, 2—2, 3—3, etc.; but taking the radial element projected in S—K, Fig. 1, as an example it is seen that the point 9—the vertical projection of S—is much higher than point 7, the projection of K. This clearly shows that the radial elements are not level, and that the "level line" method, as it is sometimes termed, for the projection of face moulds as taught by Nicholson and many other writers is a misleading one.

In Figs. 7 and 8 are shown the right sections taken at the center joint surface 3—4, as projected from the two sets of patterns. It may be noted the inside face line 8′—8, of Fig. 7, is narrower than that of 9′—9 of the outside face line. While at Fig. 8 the thickness is found equal at both faces, as projected from moulds of Figs. 5, 6.

PLATE 6A.

The diagrams presented at this plate explain the methods by means of which the curved face moulds may be developed or a rail or coping, the plan of which is a quarter circle, the coping starting from a "level" and meeting a "rake" piece. The coping, to use the term of the handrailist, "forms its own ramp." This is a problem similar to that shown at Plate 4, at which plate the development of the center falling line, together with its "tangents" and "normals" has been fully explained. It was noted that owing to the unequal rise of the coping over equal portions of the plan, the center falling line develops into a curve, instead of the straight falling line which belongs to the problems of Plates 5 and 5A, at which problems the rise of coping is equal over equal portions of the plan. At first thought the problem now to be dealt with may to the student seem a more difficult one than that of the problem shown at the plates above mentioned, but mastering the principles of projection here made use of the student will find the curved moulds may be developed with the same ease and facility as those moulds made up with straight lines. We have here as at the preceding plate constructed two sets of moulds, one to the "level line method" of Nicholson and other teachers, the other to the method adopted by the writer for a similar problem. The reader will on comparison readily see the fallacy of the former method.

In Fig. 1 is shown the plan. O represents the center with which the convex H—N, center A—G, and the concave curve P—V may be drawn. We have assumed the coping to rise a vertical height equal to that of O—6; from the conditions of the problem this rise is placed over the tangent W—G to the center point G of the upper joint surface. This is termed the "inclined tangent," the tangent W—A to the center point A of the lower

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joint surface, being termed the "level tangent." Having drawn the plan curves, the tangents A—W, W—G, and produced the radials N—V, and H—P to O; set off O—6 equal to the rise of coping. Joining A—6 the inclination of the section plane of the bed mould, and that also of the center falling line, may be obtained. Then in the manner explained at Plate 4 for the similar problem, divide the center curve A—G into any number of parts, as shown in A—B—C, etc., and parallel with the level tangent A—W through each point produce lines to meet the radial O—H. In this manner the rise of coping over any plan division may be obtained. As an example take the division C—D. The rise of coping over this portion is shown in 2′—3′. Understanding this, in H—N, of Figs. 3 and 5, set off H—I—J, etc., equal to the length of the arcs H—I—J, etc., of the convex curve of the plan. Also in V—P, Figs. 4 and 6, set off P—Q—R, etc., of the concave curve of the plan. At each point obtained erect perpendiculars equal in length to that of the corresponding verticals, as B—1, C—2, etc., of Fig. 1. Now with the points H—1—2, etc., of Figs. 5 and 6, as the centers, and with the half thickness of the coping as the radius, describe arcs as shown in the diagrams. With the aid of a flexible strip a curve may be traced tangent to the arcs, which will give the top and under lines of the moulds. Now to project the joint lines: In Figs. 5 and 6 set off N—W equal to the length A—W of the tangent of the plan; join O—W; then square with W—6 draw 9—10, which will give the direction of line required in order to form the normal plane surface of the upper joint. Then square with H—H, the base line, draw c—b and the direction may be obtained at which to form the lower plane surface joint. Suppose a joint surface to be required at the center D of the plan; simply set off K—X and S—X, equal to the length A—X or X—D of the tangent D—X to the center point D; join 3—X. Then 7—8 square with 3—X gives the direction of joint line.

Now turn to Figs. 2, 3 and 4. At Fig. 2 set off A—B equal to the stretchout of the center curve A—G of the plan; erect the perpendiculars and find the points 1—2—3, etc., as at Figs. 3 and 4. Here in order to make the constructions as favorable as possible to the methods of other teachers, we have taken the center falling mould as the parallel and directing one, instead of the convex or outside face mould which is generally taken. This center mould is shown in Fig. 2, and may be developed in the manner explained for the development of Figs. 5 and 6. The curves of the mould intercept the verticals in the points 7—8—9, etc. Now parallel with the base line H—V from each point, as 7—8, etc., produce lines meeting the corresponding verticals of Figs. 3 and 4 in the points 7—8—9, etc. Curves traced through these points will complete the moulds. Now compare the thickness given at the upper joint line of the concave face mould with that of the convex face mould, and it will be found much thinner. Consequently

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PANSHANAK

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can be delivered at about $2.25 per ton of 2,240 pounds, including freight and insurance to New York.

Chalk is used for building purposes, lime burning, glass making, manufacture of cement, colors and polishes, putty, wall papers, etc.; and as I am of opinion that American manufacturers can use the Danish chalk with advantage, I have the honor to call their attention to it.

Flint stones (pebbles) of excellent quality are also found at Stevn and exported to the United States. The price is about $15 per ton of 2-240 pounds, cost, insurance, and freight New York.—Jules Blom, Vice and Deputy Consul, Copenhagen.

GRAND CONVENTION OF MARBLE AND GRANITE DEALERS.

A MASS meeting of the marble and granite dealers of Illinois, Iowa, Nebraska, Kansas, Missouri and South Dakota is hereby called under the auspices of the Iowa and Nebraska Associations, to meet at Ogden Hotel, at Council Bluffs, Iowa, June 14, 1898, at 2 o'clock p. m.

The object of this meeting is far reaching. Aside from a program to be carried out by the most progressive thinking men of the Associations, we hope to have representatives of all the leading trade journals and the largest and most prominent manufacturers, among them Senator Proctor, of the Vermont Marble Company. Here will be a mingling and blending of ideas emanating from some of the most fertile minds and best business men of our broad land.

This call has been under advisement by the different states for a long time, and in order that the desired object may be attained, it has been deemed essential to convene at the above time and place.

You are hereby cordially invited to attend this meeting, and thus avail yourself of a grand privilege.

The Trans-Mississippi Exposition will be in full operation at this date, and with the railroad fare at one and one-third rate for the round trip, and with a $1.50 rate to each and every one at Hotel Ogden, the expense will be very light.

F. B. ALDERMAN, J. M. GRAHAM, } Presidents. J. N. KILDOW, GEO. J. GRUBER, } Secretaries.

Muscatine, Iowa, May 1, 1898.

STONE-CUTTERS OBJECT AND THEN CONCUR.

MADISON, Wis., April 27.—The State Board of Control to-day decided to refuse to sign the contract for the granite for the buildings of the new state reformatory, to be built at Green Bay, until the owners of the quarry which is to furnish the stone for the buildings guarantee that the state can in the future get all the stone needed for the completion of the buildings at the same price or less than is paid for the material of the section of the main building to be erected this season. The Amberg Granite Company, of Chicago, which is to furnish the granite, agreed to this, but recently, under pressure from its employes and the stone-cutters' union, withdrew the guarantee. The Amberg company quarry is near Marinette.

The board's plan was to build a section of the main building this season.

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FOR MAKING ROLLED DRAWINGS



CEMENT AND LIME.

GREAT BRITAIN'S CEMENT EXPORT BUSINESS IN 1897.

THE favorable reports we were able to publish last year may now be reviewed in the light of the Board of Trade Returns recently issued, which show that the movement was well maintained during December, when the value of the cement exports reached £46,752, the quantity being 27,044 tons. The figures relating to Canada were most remarkable, for while in the last month of 1895 and 1896 only 138 tons and 4 tons respectively were exported to the Dominion, no fewer than 1,501 tons were sent thither in 1897. This sudden increase, however, failed to carry the year's transactions with British North America above those of preceding years. In fact, the exports for 1897, valued at £22,498, were £10,000 below those of 1896.

Looking at the total results, the cement exports of 1897 reached £647,919, as compared with £580,417 in the previous year, and were about £6,000 above the return for 1895, although the quantity was a thousand tons less. The United States took cement to the value of £107,177; the British possessions in South Africa were responsible for £71,601; those in the East Indies, £63,588, and in Australasia to £63,739. The Argentine took £38,332 worth; Brazil, £38-332; Holland, £14,077, and "other countries," £227,103. We really think the authorities should endeavor to classify the latter amount so as to make it easy for our manufactures to know the prospects and possibilities of trade in foreign countries.—Timber.

A NEW INDUSTRY IN PENNSYLVANIA.

THERE have been many speculations as to the means of support of Pennsylvania's millions of people when the state's store of anthracite coal has been exhausted and her iron and steel industries are attacked by Southern competition in the same way that the New England cotton industry has been attacked, says the Philadelphia Inquirer. Pennsylvania can learn nothing from New England as yet, because the people of that section have not fully appreciated so far the obvious industrial fate in store for them; but that when the time comes the people of New England and Pennsylvania will find ways of supporting themselves, after some drifting away of population, we may feel confident.

The establishment and rapid growth of the cement industry in Pennsyl-

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arrangement by which the works will be run. Mr. Sikking has had practical experience in the business, and says that the Falling Springs output compares favorably with the best grades.

THE FLOORING OF POWDER MAGAZINES.

CEMENT floors in powder magazines are rightly considered dangerous, and have long been prohibited in France; and in Belgium, since 1894, the Mine Regulations require that the floors of powder magazines of whatever size be made up of asphalt or planks of wood. Cracks and cavities are apt to form in cement, and these constitute receptacles for inflammable matter; besides, it nearly always contains siliceous particles, which may cause ignition from friction or shock. The Belgian Minister of Industry and Work has issued a circular, calling the attention of mine inspectors to the necessity, when authorizing a powder magazine, of requiring that the regulations be strictly observed in this particular, and also that timber floors be made of oak planks, well jointed, free from cracks, and made perfectly smooth.

GYPSUM IN ARIZONA.

ACCORDING to the Tombstone Prospector, there are large quantities of gypsum in Cochise county, convenient to the railroad, and in quantities sufficient to justify its handling on an extensive scale. It says: "The Prospector has some samples of gypsum which are pronounced by experts to be of fine quality and good grade. The property is one of merit and worthy of investigation, and but awaits capital to open it and place the mineral on the market. The gypsum when calcined forms plaster of paris, and is often improperly termed so. The mineral consists of a sulphate of lime and percentage of water. The transparent varieties which are to be found here are called selenite, and in many respects resemble mica. We hope at no distant day to see these beds of gypsum developed by parties who will avail themselves of the opportunity, and are in a position to handle the product."

NEW DEVICE FOR QUICKLY "DRAWING" LIME FROM KILNS.

MR. G. A. MACE, president and general manager of the Milwaukee Falls Lime Company, at Grafton, Wis., has perfected an appliance for use in lime kilns that appearsdestined to revolutionize the present method of handling lime by manufacturers. It consists of a steel elevator by means of which hot lime is drawn from a kiln in less than five minutes and

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Rockport a strike was attempted, a few men quitting work one day, but going back the next.—Gazette.

If all creditors were as slow about collecting what is due as are those of the Akron White Sand and Stone Company, "life would be worth living," says the Akron (O.) Democrat. For more than two years W. E. Slabaugh has had $1,100 in his possession that belongs to the numerous creditors of the defunct concern mentioned. During all that time no one has asked that the money be distributed. It is drawing 4 per cent. interest in the bank where it is deposited. The money was secured by the sale of the plant of company. It represents practically all that can be raised, except the amount the stockholders will be forced to pay. The debts against the company aggregate $50,000. Mr. Slabaugh will not distribute the money until some one asks the court to make an order for the same.

Montreal, Canada.—No change of importance is expected in the cement market until the arrival of the first steamer, which will be early in May. The summer quotations will then be announced. One thousand barrels of high grade cement for immediate delivery for the Public Works account. Import orders are booked at $2.25 to $2.35 for English brands, and $1.90 to $2.10 for Belgian.

Republic, Mo.—Another new industry is being pushed to completion. A lime kiln with all the latest improvements will soon be in operation and promises great success. The officers are: Dr. G. B. Dorrell, president; A. D. King, vice president; O. D. Lutz, secretary; John McKnab, treasurer, and P. O. Rainey, manager.

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THE ELYRIA ARCHES.*

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THE PEN ARGYL SLATE INDUSTRY.

A VISIT to the several quarries in the Pen Argyl section will show an activity unusual for this time of the year, says the Index. The demand for slate, particularly for export, having continued throughout the winter, the season opens with scarcely any slate on the banks, and at every quarry operations are being pushed so as to make as many slate as possible to meet any demand that may arise. If the war with Spain does not affect the home market too much, or interfere with the export trade, the season of 1898 will be the greatest the Pen Argyl slate industry ever experienced. The work done at the quarries during the winter in the way of removing top and cleaning out rubbish has been fraught with wonderful results. Every quarry, with but one exception, the United States, is as clean as a pin. The pitch of the rock in the United States and its nearness to the Excelsior dump, possibly, prevents that quarry from being kept in the "spick and span" condition of the rest.

William Masters Sons, of the Excelsior quarry, produced 1,500 squares in March, and their quarry is in condition for the production of several hundred squares more this month.

During the year the Jackson Slate Company will spend $3,000 in improving their equipment. Their production during the summer will average over 2,000 squares a month.

After several years of hard work, combined with great persistency, Jackson Bros. are finally reaping their reward, and in the language of the slater are "getting a quarry." The removal of a large body of top during the past two years has given them plenty of elbow-room, and to-day there is exposed in their quarry a body of slate which will put Jackson Bros. in the list of Pen Argyl's heaviest producers this season. The export trade established by them during the past six months has opened a market for all they can produce.

Stephens, Jackson & Co.'s quarry, the Courtney, has often been termed the "gold mine" of the section, and its present condition gives indication of

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IMPROVED MACHINERY IN SILK MAKING.

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lose sight of the fact that among the slate quarries they can find an excellent market.—Engineering and Mining Journal.

The home trade for roofing slate does not yet show any great activity. Only an occasional order is received by our operators for the home market. It is too early in the season to tell what strength the market will develop later in the year. Probabilities are, however, that if this war excitement continues, there will be very few building operations this year, as it will have a tendency to temporarily demoralize the business interests of the whole country.—Pen Argyl Index.

A meeting of the stockholders in the National Slate Mining and Roofing Company was held March 28 and was attended by a large number of gentlemen from towns in eastern Ohio and western Pennsylvania. Many matters of interest relative to the company were talked on, although the matter of prices was not touched as had been expected. Nearly thirty stockholders were present and talked over the prospect of the slate trade for the next season. All the gentlemen present seemed confident and expressed it as their opinion that the coming summer would see a decided boom in the business. The relation of the slate miners and dealers was also talked on and all thought that the relation was all that could be desired.

York, Pa.—The slate quarries are expected to increase their force of employes and get out a larger production of slate than heretofore immediately.

Monson, Me.—The Monson Burmah Slate Company discharged sixteen men April 30, and will run crew enough to keep the pile cleared up until business improves. The entire crew at the Monson Pond quarry quit work April 30. It is claimed that five months' wages are due them. General Manager Proctor is in Monson to make some proposals to the men in regard to starting again.

Wrightsville, Pa.—Mr William McConkey, of Baltimore, Md., has engaged a force of men to open his slate quarry near here. If he is successful it will give employment to about forty men.

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INTER-STATE WARFARE

We extract the following from an address by Hon. James C. Batterson, delivered at a meeting of insurance men in Hartford, Conn., several months ago. It directs attention to one of the most remarkable and dangerous legislative enactments in the history of this country.

Retaliation, in spite of late years, has become a principle of legislation not only between states but between nations. The power is denied in the text of any constitution, but it is such a development and expansion of governmental powers that the acts of retaliatory legislation are not often questioned on constitutional grounds. This sort of legislation is never without grave consequences by fomenting inter-state animosities and the unworthy greed of taxing foreign corporations for the payment of local expenses. It is plain that we have come to carry this species of legislation far enough to destroy all comity between states and to undermine the fundamental structure of all reciprocal relations.

Nothing is confined to separate localities. The selfish businesses of state protection are already running into industrial pursuits. The state of New York would be probably more than any other state to be dependent upon the resources drawn from other states for her boasted title of being the Empire state, has gravely enacted that while the public buildings of that great commonwealth may be constructed of the granites of New England, yet that material shall not be used unless the rough stock is first transported to and wrought within her own borders. This bill was hurried through the legislature in the interest of a granite quarry newly opened in the state of New York. True it is that the cost of the completed work is increased by at least 5 per cent; but that did not stop the passage of the bill nor prevent the use of the material as desired. It was an act of pure extortion, by which the state has to pay an extravagant penalty and more is thereby taxed than the transportation consumes which gets for its share the carriage of more than one material and of which is waste.

The most outrageous law of the New York Legislature is that which requires any citizen in that state shall employ any granite cutter in New England or elsewhere to cut [illegible] and deliver the material for a court house or other building unless the labor on such material as shall be used within the state may be performed by citizens of the state. The citizens of [illegible] or any other of the contracting parties, may require the [illegible]

ings to be all performed within the city limits and by her own citizens; but has the Legislature of New York the constitutional right to prohibit the city of Buffalo from using materials on any public buildings which are worked by laborers in other states? Is not this a restriction on inter-state trade and commerce forbidden by the constitution? Does not such an act deprive the citizens of Maine and Connecticut of privileges in the state of New York which citizens of New York enjoy in Maine and Connecticut? Certainly this sort of legislation does not promote the friendly relations between the inhabitants of different states which are referred to in the constitution, and their preservation contemplated.

SARDINIAN ROUND TOWERS.

THE interior of the truncated cone or tower consists of one, two or three domed chambers placed one above the other, and diminishing in size in proportion to the external inclination, the lowest averaging from 15 to 20 feet in diameter, and from 20 to 25 in height. The base of each is always circular, but, when otherwise, is elliptical; the edges of the stones where the tiers overlay each other are worked off, so that the exterior assumes a semi-oval form, or that of which the section would be a parabola, the apex being crowned with a large flat stone resting on the last circular layer, which is reduced to a small diameter. In the interior of the lowest chamber, and on a level with the floor, are frequently from two to four niches, formed in the thickness of the masonry without external communication, varying from 3 to 6 feet long, 2 to 4 wide, and 2 to 5 high, and only accessible by very small entrances. The access to the second and third chambers, as well as to the platform on the top of those at Nuraghi which have only one chamber, is by a spiral corridor made in the building, either as a single ramp, with a gradual ascent, or with rough, irregular steps made in the stones. The corridor varies from 3 to 6 feet in height, and from 2 to 4 in width, and the outer side either inclines according to the external wall of the cone, and the inner side according to the domed chamber, or resembles in the section the segment of a circle. The entrance to this spiral corridor is generally in the horizontal passage which leads from the external entrance to the first-floor chamber of the cone; though sometimes it is by a small aperture in the chamber, about 6 or 8 feet from the base, and very difficult of entry. The upper chambers are entered by a small passage at right angles to this corridor, and opposite to this passage is often a small aperture in the outer wall, having apparently no regular position, though frequently over the external entrance to the ground floor; while in some instances there are several apertures so made that only the sky or most distant objects in the horizon are visible.—The Architect, London.

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TIMELY TOPICS



Impressive
Memorials

Cemetery
Conversationalism

A Market
for Eloquence

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monly cement is used, and for the ordinary residence cellar in imperfectly drained soil. Experience has shown there is no material so well adapted to insure perfect dryness and cool temperature in all seasons as flagstone. It does not crack or disintegrate, does not become uneven, or hold water in spots, and is easily kept clean. The flagstone floor with cemented joints is the thing.

Demonstrating Road Building. A manufacturer of stone crushers follows a novel plan of demonstrating the effectiveness of his machine, and at the same time helps along the movement for good roads, by sending one of his machines on a show circuit of country towns. He bills the towns like a four-ring circus and gives exhibitions of crushing stone and road building free of cost. Nine cases out of ten he sells the machine. The act is after the manner of the bootblack who agrees to polish one boot to demonstrate the excellence of his polish and of skill in applying it, but charges full price for finishing the other foot in same style. Such methods are not always to be decried. The man whose boots require polish and who is too slovenly to have it done, or do it himself, deserves no sympathy if the job is executed without his order and the cost assessed against him. So, if a town or township whose inhabitants are too niggardly to put its highways into passable condition, if a stone-crusher man puts down a patch of roadway so excellent that the people cry for more of the same sort, the duty is imposed upon the authorities to at once arrange to satisfy the demand. The first essential is a stone-crusher of ample size. The supply of stone to make road metal is rarely found inadequate where macadam should be built. Every county ought to own a stone-crusher like the Austin, for instance. It would prove the best investment that could be made in the way of road improvement.

Trade Conditions. Considering the obstacles that are perpetually in the way of its progress, is it any wonder that little advancement is conceded in the stone industry? We know that the business is most seriously affected at times when every condition seems favorable. A prosperous era in building is sure to be followed by outbreaks in the labor field. When little building is being done the substitution of cheaper material than stone, depressed prices, or excessive cost of production transfers the balance to the wrong side of the ledger. Quarrymen and mill operators declare there is no profit in the stone business nowadays, whatever the general conditions of the trade are. It is, therefore, remarkable that investment in stone land and in its development, should proceed as it is proceeding, under these alleged circumstances. Our current reports show that new quarries by the score are being opened every month, old quarries are being re-equipped, and production revives. We cannot explain the apparent difference in this increase of supply and the reduced demand. The utility of limestone in cement production—an item of commerce that has grown to immense proportions in recent years, absorbs a goodly portion of the increased output, no doubt; the tendency everywhere to lay good roads on city thoroughfare and on country highway, surely creates a real and prospective demand for millions of tons of crushed stone; the solid sense that revives out of error and enlightens the builder who has daudled with "jerry" methods to his full satisfaction, certainly accounts for some of it, yet, in the face

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The Judge or the Jury. [illegible]

The Season. [illegible]

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two to run, and the war with Spain probably has had to do with maintaining peace at home in the domains of labor. It has checked prosperity in the stone trade surely enough, as it has stopped progress for a time in most lines of trade. The emoluments of victory will be something enormous if our forces continue to gather in Spain's rich possessions as they have during the first few weeks of the conflict. All this will intensify the future demand for American products. Every branch of industrial work will be pushed to full capacity, in repairing the ravages of war and in supplying depleted markets. Think of what we will have to do to rehabilitate Cuba alone, when the Spaniard's grasp is taken from that unfortunate land. This is no time for quarreling among ourselves over the work-day or wage bill. These will right themselves long before we are again called upon to consider the sole salvation of our industrial interests. The prosperity that was coming along so splendidly during the last twelve months is only temporarily headed by the tremendous activities of war; it will not lose any of its inherent force by being held in check for a short time.

Inter-State Commercial Warfare. It was to be expected that the law alike and enacted by several states, and which is best known and understood by readers of STONE as "the dressed stone law," would be a constant "bone of contention" until the constitutionality of such a law could be passed upon by the supreme court of the nation, and such is the case. In New York, where this specimen of selfish legislation was first brought forth at the behest of corrupting contractors and quarrymen, abetted by professional laborites, the courts are burdened with complaints arising out of its enforcement. The proposition that the stone merchant of one state may not deliver his product to a customer in another state, who has a contract for public work, in the form which that customer desires it, is so monstrously at variance with the rights of legitimate trading, that it is simply astounding that the law-makers of any state should attempt to enforce it by statute. If stone, though it be required for public buildings, can be barred from admission because it has been manufactured, or "dressed," in another state, then the private contract is involved with the thousands of legitimate articles that may be likewise treated, if the selfishness of home producers and manufacturers be invoked against their introduction. Where would the evil of such law-making lead to? The few wool-growers in New York State are entitled to the same "protection" as the few quarrymen there, and the spinners' and weavers' unions in that state as the stone-cutters' unions. And so, all through the list of commercial enterprises.

On another page we present the views of James G. Batterson regarding this sort of inter-state warfare. Mr. Batterson is largely interested in the stone industry, as well as being conspicuous as an insurance manager. What he says may be taken as the conclusions of a man who has given the subject profound thought.

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SELECTED MISCELLANY.

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tion how thick this crumpling solid dome must be. If we extend by inference the heat observed increasing downwards as we dig below the surface, a temperature is very quickly reached at which all solids, that we know, would melt. The thinness of the shell which this implies has seemed unlikely or absurd to many, who have attempted to discredit such conclusions in two ways: Firstly, by astronomical deductions, which seem to imply that the earth's globe is, as a whole, more rigid than could be such a bag of molten matter; and, secondly, by pointing out that the majority of earths expand when melting, so that enormous pressures, which they say must exist at great depths underneath the ground, would raise their melting points as fast as increased depth augments the temperature. Taking this latter argument the first, its value vanishes when we remember that temperature critical for fusion hold as surely as they do for condensation. No increased pressure liquifies a gas if it contain a certain quantity of heat; no increased pressure will make solid fluids if raised beyond a certain temperature; besides, what pressure can exist beneath a dome when it is on the point of failing as an arch?

The astronomical objection, though probably fallacious, cannot be dismissed in quite so cavalier a manner. The tides it is supposed the moon, however, would raise in such a nearly fluid ball, might very possibly exist unnoticed. The ocean tides if unobstructed would not exceed three feet or so, while how much smaller would they be in an inclosed and highly viscous mass? Viscosity would render motion very slow, so that before considerable pressure could anywhere be brought to bear upon the crust, the moon's quick-changing action would have been reversed.

In either case, moreover, whether the earth inside be hard or soft, cooling must cause contraction. The outer shells, crushed by their own weight, crumple and give way; each little shear and yielding raises tremors—the earthquakes once looked on with so much dread—but which should rather be esteemed as subterranean rainbows assuring us the earth's crust still yields harmlessly and well—the deluge is not yet.

In time the crust must surely become so thick as vaulted, to support the pressure; then earthquakes certainly will cease. The core, however, must go on contracting, and whether ultimately in a vacant space the nucleus lies eccentric like a shriveled kernel in a nut, or whether sea and atmosphere burst in—as once was doubtless witnessed on the moon—the earth, for a short time at least, will not form pleasant habitat for man.

ANCIENT MEXICAN MONUMENTS.

WITHIN an hour's ride of the City of Mexico the traveler can reach one of the many ancient ruins that dot this country and whose history was as mysterious when Cortez landed as it is now. The pyramids of the sun and moon are near the little city of San Juan Teotihuacan on the line of the Mexican Railway. From the evidences that are still to be found about these ancient monuments they once stood in the midst of an extensive city extending at least several miles from them in every direction. Viewed from the railroad the pyramids do not appear very formidable because the eye compares their height with that of the small mountain, Cerro Gordo, near by. Janvier gives the following detailed information about these evidences of a prehistoric civilization:

The pyramid of the sun, according to the very careful measurements of Senor Garcia 216 feet 8 inches high, with a base 761 feet by 721 feet 7 inches. The platform on the top is 59 feet from north to south, by 105 feet from east to west. The pyramid of the moon is 150 feet 11 inches high, with a base 511 feet by 426 feet 5 inches, and a crowning platform 19 feet 8 inches square. The only entrance as yet discovered is found on the southern face of the pyramid of the moon at a height of 65 feet from the ground. This gives inlet to a narrow descending gallery, interrupted by a deep, square well, the walls of which are laid up with carefully squared stone. The axis of this gallery (observation of Senor Garcia Cubas) coincides exactly with the magnetic meridian. Beyond the gallery the interior remains unexplored. The pyramid of the sun has not been entered at all. To the south of the pyramid of the sun is a large earthwork known as the ciudadela (citadel), a square inclosed by a mound averaging 262 feet thick by 32 feet high. In the center of the inclosed

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mill, whose foundations are built of the same beautiful material.

"During the building of the town thousands of men prospected the entire country, and shafts and tunnels were driven—some of them nearly one hundred feet deep, but strange as it may seem, there was never enough gold found to pay the cost of a single shaft or tunnel sunk or run in the entire district. So excited did the farmers around Bridgewater become that they actually hired guards to keep men from going on their land to pick up gold. Pat Kehoe, an old Irishman who owned one hundred acres of rock-strewn, barren land, was offered $125,000 for his holding, but held out for $150,000. To-day you could buy the property for probably $150.

"One rancher, whose farm adjoined 'Aladdin's Cave,' the place where the original nugget was found, sold five acres to an English syndicate for $100,000, and it is an established fact that the syndicate spent as much more in developing their claim, as everything was very costly, all material having to be hauled nearly fifty miles, over rough roads; and they did not get a single ounce of free gold out of their purchase. But they mined some quartz—about one hundred tons—shipped it to the States, and, in return, got a bill from the smelting company for $360 smelting charges over and above the gold in the quartz. This was the first, and I believe the last, shipment of quartz ever made, as the cost of hauling, shipping and smelting was $150 a ton more than the rock produced."—Portland Oregonian.

ENDURANCE OF IGNEOUS ROCKS.

WHINSTONES or basalts become disintegrated under the effects of exposure to the atmosphere in consequence of the variable proportions of feldspar they contain, and perhaps also of the particular combinations of alumina, lime and magnesia, which, in connection with silica, constitute their base. If any potassa be present in combination with the silica in the shape of feldspar, the action is more rapid than under ordinary circumstances, the humidity of the atmosphere decomposing the feldspar into two substances, one of which is soluble and easily removed by succeeding rains. Serpentines and the diallage rocks, which are magnesia combined with hydrates of that base, yield easily to the attacks of acids when the silicates are in certain proportions and alumina is present. The most beautiful varieties of these materials employed in the arts are obtained from the environs of Genoa, and from Zœblitz in Saxony; but it is much to be feared that the atmosphere of large towns, especially when containing sulphuric acid gas from the combustion of coal, renders the employment of even the best of these decorative materials very hazardous. It appears also that in parting with their water of crystallization upon exposure to the air, an uneqal contraction takes place in the constituent parts of the serpentine obtained in certain localities, which in consequence breaks in an irregular manner.—The Architect, London.

PETRIFIED WOOD.

A COMPANY has been formed in South Dakota for cutting and polishing stone from the petrified forest, near Holbrook, Ariz., for architectural and decorative work. Sections of these trees, four feet in diameter and large enough for the tops of tables, have been cut and polished. Many specimens were shown at the Paris Exposition, where they were greatly admired for the perfect preservation of every detail of structure of and for the exquisite interblending of the colors in the mass, due to the presence of various oxides, in the original silicifying solutions. The Mining and Scientific Press says:

"No other country in the world can send to the lapidary such magnificent raw material of this nature as the petrified forests of Arizona afford. Not even the imperial works at Elkaterinburg, Russia, with the wealth of kalkansto jasper, massive malachita and other superb ornamental stones, can rival the beauty of the agatized wood of Arizona.

"Recent reports received by the Interior Department about the condition of this forest indicate that it is rapidly being used up for commercial purposes, and unless the government steps in to stop the despoilment, the whole forest, which is one of the greatest natural curiosities in the world, will disappear.

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MANSFIELD, OHIO.

My report for May issue has been held back that I might be able to report the commencing of the building of the west wing of the State Reformatory, but for lack of funds it will not be built this year.

The Y. M. C. A., of Newark, O., are going to build a hall; cost, $20,000.

Mt. Vernon, O., is to build a high school building; brick with stone trimmings; cost, $20,000.

English Lutherans, of Shelby, are to build a church; brick with stone trimmings; cost, $20,000.

O'CONNOR.

Mansfield, O., May 2.

ABERDEEN, SCOTLAND.

There is little of anything but local interest to record of the stone trade in the meantime. With the arrival of something like spring weather the lull in house building in the city has passed away, and a large number of plans of new buildings are of greater aggregate value than have previously been disposed of at single sittings or have been approved of at last two meetings of the Town Council's plans committee. Recent sales also show an extraordinary rise in the value of house and business property in the center of the city. The lull in the building trade became noticeable only on account of there having been such a boom before. In reality a great amount of building has been going on. Operative plasterers have benefited by this. In order to avert a threatened strike employers conceded a rise in wages of ½d per hour. Men in the plasterer trade cannot, in fact, be got at this time, and, for example, operations at the Corporation Lodging House have had to be suspended owing to this cause. A request for rise of pay by plasterers' laborers is also under the consideration of the Conciliation Board.

To speak further of labor disputes, the Board referred to have rejected the operative joiners' demand for an eight-hour working day and a rise of 1d an hour in wages—a decision which has pleased the employers generally in the building trade, as they were afraid of the eight-hour agitation spreading. With regard, however, to minor demands, such as increased rate of pay for extra time, the operative joiners have been partially successful.

Granite quarries have continued busy all along, to meet local and export requirements. As regards the monumental trade, I find, from recent personal inquiry, that about 90 per cent. are now fairly busy, though the remainder complain of dullness of trade. There does not appear to be any especially notable monuments in progress at present.

The dividend for last year to the shareholders of A. Macdonald & Co., Aberdeen Granite Works, was at the rate of 7½ per cent. per annum. The net profit was £2930 10s; £500 was added to reserve and depreciation fund, and £286 19s 6d has been carried forward. There had been an exceptional expenditure in sinking operations at Wirtinghill quarry (in the Peterhead district), where red granite is got.

The standard rate of wages to monumental stone-cutters in Aberdeen has been raised from 6½d to 7d per hour after May 2, while operative polishers are in future to work only fifty-one hours (in place of fifty-six) per week, the same as the stone-cutters. The question of "piece" vs. "time" work, and as to the rate of pay in the polishing trade, is not yet definitely settled.

Aberdeen, April 8. HEATERBLOW.

SEATTLE, WASH.

New theater building let to James Spurr; all brick.

The building of Yukon River boats is the leading line of industry.

Rumors of war retard the contemplated buildings.

WARE.

Seattle, Wash.

SAULT ST. MARIE, MICH.

The snow has gone from here and we have good weather now to build anything that comes out. There is not much doing yet except a few small basements for frame buildings.

If the water power project goes ahead, and I think it is sure this time, there will be numerous large jobs. There are a great many people ready to build as soon as they are convinced it is a sure thing that the water power is all right.

The Times of April 13 says: "We assure the people of the Soo that a water power development is almost a certainty for the near future. We are not able to state how large the contracts will be, but have been told they will aggregate about a million dollars. We under-

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opened before the date above mentioned, and that all railroads have made a rate of one and one-third fare to Council Bluffs and return, and we have arranged with the Ogden Hotel for a rate of $1.50 per day for each and every person. Yours truly,

IOWA MARBLE & GRANINE DEALERS' ASSN.,
GEO. J. GRUBER, Sec'y.

Muscatine, Iowa, April 26.

MILWAUKEE, WIS.

The present prospects are an addition to St. Joseph's Hospital, 78x53 feet in dimension, and four stories high.

Bonnett, Michie & Co., of this city, have quite a contract of masonry and stone work at River Falls, Wis.

The intermediate prison is also being built at Green Bay, Wis.

Changes are being made in the Racine post-office. The Madison Library is under way now.

P. A. Savage is building a flat building, to cost $3,500. BREITKRENTZ.

Milwaukee, Wis., April 14.

PARKERSBURG, W. VA.

There is not much news to be had here since last letter. The contract for an addition to Trinity church should have been let yesterday. It is all stone, two sides 60′x60′. I did not hear who got the job.

The bids are all in for a three-story business house for Mullen, to be of buff brick and Cleveland stone. W. A. Patton, architect.

John Daniels, the contractor, has commenced work on the Citizen's Bank. The footing work will be concrete and "I"-beams; basement of brick and first story stone, and four stories of brick with stone trimmings. Yost & Packard, of Columbus, O., architects. STOYLE.

Parkersburg, W. Va., April 17.

FORT WORTH, TEX.

The state of the stone trade in this part of Texas is quiet.

The approaches to the new union depot that I mentioned in my former letter was not let at the time set, and there has nothing been done about it since. Nothing going on in this city in the stone line whatever.

The Santa Fe Railroad Company are doing a large amount of bridge masonry on their Texas line. They get all their stone at Belton, Tex. They have up seven big steam derricks down there and are doing an immense amount of work.

Bids were to be opened on April 15, at Georgetown, Tex., for a $60,000 wing to the Georgetown College.

Bids were opened on April 12 for a court house at Giddings, Tex.

The Santa Fe company were to let their shops at Clebourne and round house at Temple on the 20th, but I did not learn who got them.

The court house at Orange, Tex., was let early in the month. It will be of brick and the famous Pecos red sandstone trimmings.

Fort Worth, Tex., April 22. TEXAS.

DAYTON, O.

In regard to our trade it is still keeping dull. About the new Union Depot there is not much sign for one yet.

The new flat on the corner of Third and Sheldon streets will be eight stories high. They are tearing down the old building now. The plans will be ready in a short time. Two stories will be of stone and the remainder of brick with stone trimmings. It will have 102 feet front on Ludlow street and 96 feet on third. I think it will be of freestone but am not sure.

The traction line between here and Eaton, O., is going on fast. The track is pretty well along. By the last of June I think it will be in operation.

Bids on a new Catholic church will be received in a few days; brick, with stone trimmings. This church is to be built in Middletown, O.

We are waiting patiently for business to open up. D'ONOFRIO.

Dayton, O., April 18.

DETROIT, MICH.

George Green, of the Maine and New Hampshire Granite Company, says that some of the stones already placed in the new county building are larger than any in a public building in the United States, with the exception of the United States Congressional Library and the Treasury buildings. The capstones for the windows on the second floor weigh nearly twenty tons apiece and are 19 feet long, 7 feet wide and 21 inches thick.

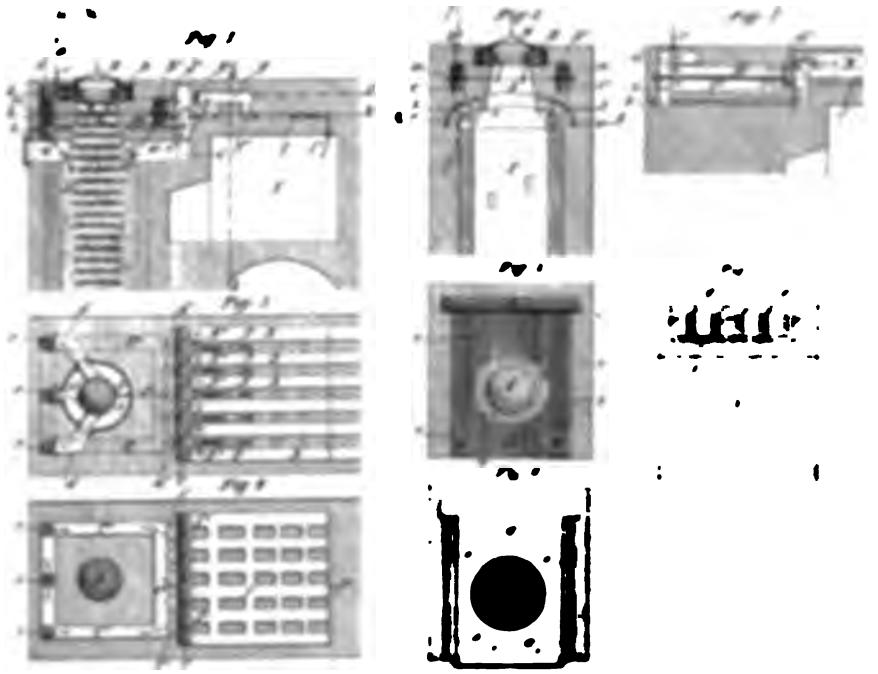
Contractor Robertson has his $30,000 stone-sawing plant nearly completed. The tramway for the handling of stone is one hundred feet long and has a span sixty feet wide. The plant has capacity for seventy-five to one hundred stone sawyers.

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RECENT PATENTS.

[illegible] FOR BURNING LIME CEMENT ETC

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the charging cone A to a high temperature. Besides by this outlet, called "continuous lower" outlet, the gases escape also by the outlet called "intermittent upper" which works only when the cover E is closed. This escape takes place above the charge by the circular flue D, the conduits *d* and the flue D′, and from there through the aperture *d′* into the combustion-chamber. As soon as the cover E is raised for a new charging the dampers *r* are closed, and the gas escapes only by the lower outlet. The continuity of the latter is assured by the judicious opening of the dampers of the chimney into which the flues B open, which opening causes a draft just feeble enough to draw out the gases without admitting any air to the open charging-cone. The obduration of the charging cone is then effected by the charge in the cone A and the depression created by the draft of the chimney. When the cover E is closed, the upper outlet comes again into action. It is therefore really intermittent. All the gases disengaged by the burning are so delivered, as shown, to the combustion-chamber or conduit C, where they are burned for the purpose of collecting their heating power and utilizing the same in drying-chambers located behind the kiln, where the pastes or limestones to be burned are dried before being fed into the kiln. For this purpose the said gases are mixed with air admitted by the conduits *e* and the apertures *f* and *g*. This outside air is strongly heated first and then injected perpendicularly to the current of gas to be burned. It will be noticed that these injections operate at different points in such a manner that not a particle of carbonic oxid can pass without being burned.

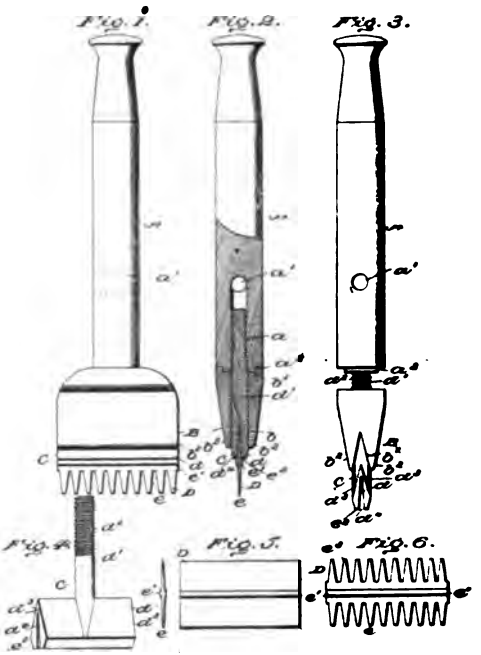
The currents of gas are indicated by arrows in full lines and the currents of air by arrows in broken lines.

STONE-WORKING TOOL.

Patent No. 600,808, issued March 15, 1898, to James Sinclair, of Marquette, Mich. Application filed August 3, 1897.

This invention contemplates certain new and useful improvements in stone-working tools; and it has for its object the production of a simple and inexpensive tool-holder adapted to securely hold chisels of various styles in operative position.

In practice the chisel or cutting member is inserted into the slot d^4 of the holder D, and the rod of the latter being passed through the coincident bores of the clamp and handle the latter is turned so as to draw the holder up into the clamp and to bind the latter firm against the lower end of said handle, any suitable rod being inserted through the transverse opening *a′* to aid in screwing the parts together. As the holder is drawn into the recess between the rigid jaws b^2 the jaws of said holder are forced to firmly grasp and bind the chisel. In this way the latter is securely held in place. To



substitute one chisel for another or reverse edge for edge, it is only necessary to loosen the parts sufficient to release the holder D from the binding action of the rigid jaws of the clamp.

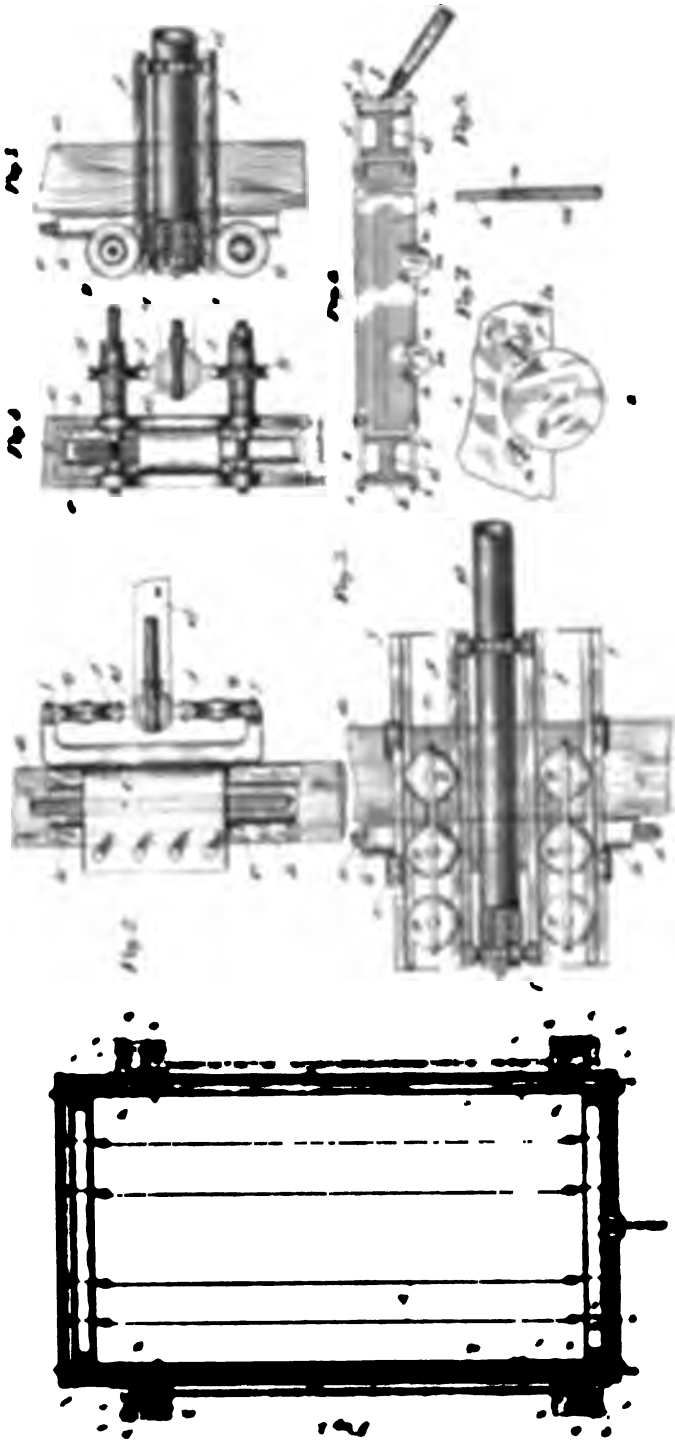
The advantages of this invention are apparent, and it will be speedily observed that different styles of chisels or other cutting members can be readily and easily substituted one for the other. A tool-carrier thus constructed is extremely simple and inexpensive.

STONE-SAWING MACHINE.

Patent No. 598,446, issued Feb. 1, 1898, to Frederick W. Shettleworth, of Portland, Conn. Application filed April 5, 1897.

Figure 1 is a view from above, in the nature of a plan view, with the parts which are above the saw-frame removed. Fig. 2 is a detail face view, on an enlarged scale, of one of the guide-

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blocks, with the parts appurtenant thereto, which are to be found at each corner-post of the machine. Fig. 3 is a detail side view of the parts shown in Fig. 2, on the same scale. Fig. 4 is a detail view similar in its general nature to Fig. 3, showing a modification. Fig. 5 is a side view of the parts shown in Fig. 4. Fig. 6 is a detail side view of a saw-blade which may be used in this connection and of the devices at the ends for attaching such blade to the saw-frame. Fig. 7 is a detail side view, on an enlarged scale, of a saw-tooth and the neighboring part of a saw-blade. Fig. 8 is a view of the same parts which are shown in Fig. 7, in cross-section, on the plane denoted by the letters *x x* in that figure.

The embodied invention is a machine specially adapted for sawing stone. All the parts of the machine are not shown, because those not shown are well known. A machine of this class, but destitute of the special features of improvement described and claimed herein, is shown in United States Patent No. 283,929, dated August 28, 1883.

In machines at present in general use for sawing stone and using a gang of saws it is the rule that the saw-frame has a pendulous movement. In the machine of this patent the saw-frame is adapted for reciprocation in one plane, although the saw-frame may be raised and lowered at pleasure.

The letters *a* denote the four corner-posts of the machine.

The letters *b* denote ways of channel-iron secured in vertical lines to the posts *a*.

The letters *c* denote way-blocks which travel up and down on the ways *b*.

The letters *e* denote vertical adjusting-screws taking through the way-blocks, by means of which the plane in which the saw-frame shall reciprocate can be altered at pleasure. Practically all these screws are operated simultaneously by a device well known in the prior art.

The letters *f* denote guide-rails of angular shape in cross-section (practically square) which are attached to and carried by the saw-frame. The letters *g* denote rolls whose faces have an angular shape corresponding to that of said guide-rails, which confine and coöperate with said guide-rails both above and below the same. Although these rolls may, as seen in Figs. 4 and 5, be hung upon stationary shafts, the preferable mode is to make them true friction-rolls, as shown in Figs. 2 and 3, resting at the back against other suitably-shaped rails which are carried by the said way-blocks. This construction gives as a result the reciprocation of the saws and saw-frame in one plane in lieu of the said pendulous motion common to the prior art.

A construction and arrangement for dealing with and adjusting the tension of the saw-blades in the saw-frame is brought out more clearly in Fig. 6 than elsewhere. There the letters *d* denote the end bars of the saw-frame, a saw being denoted by the letter *h*. The saw is attached to the ends of the saw-frame by the nuts and bolts *i i'* and the plates *k*. The letter *l* denotes a cam-lever hung in the plate *k* and adapted to have its cam coöperate with the outer surface of the end bar of the saw-frame. In practice the operator throws the cam-lever into substantially the position shown in Fig. 6 and then gives the saw its proper tension in the frame by means of the nuts *i'*. Then when he wishes to adjust the saw to a different position laterally he has only to throw the cam-lever up, adjust the saw-blade laterally, and then throw the cam-lever down, when he has the saw-blade in its new adjustment with practically its original tension, which is designed to be the same as that of all the other saw-blades in the frame.

In Figs. 7 and 8 there is brought out a new shape and construction of tooth for saw-blades of this general nature. The saw-tooth *m* is round, and the edge is grooved, as seen in Fig. 8. The saw-blade has a correspondingly-shaped saw-tooth sent to receive the saw-tooth, and the edge of that tooth has a shape corresponding to the shape of the edge of the saw-tooth. The letters *n* denote screws set into the saw-blade and with their heads extending into correspondingly-shaped sockets in the periphery of the saw-tooth, so that these screws coöperate with the saw-blade and the saw-tooth in such fashion as to hold the saw-tooth to its seat in the saw-blade.

In the operation of sawing stone small steel balls resembling shot are used underneath the saw-teeth. These teeth are made of gun-metal, and thereby giving improved frictional contact with the small steel balls and a lengthened life of the saw-teeth.

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"AUNT 'MANDY."



OUR Aunt 'Mandy thinks 'at boys
Never oughter make a noise,
Or go swimmin' or play ball,
Or have any fun at all;
Thinks a boy 'ud oughter be
Dressed up all the time, an' she
Hollers jest as if she's hurt
At the *littlest mite* er dirt
On a feller's hands or face,
Or his clothes, or any place.

Then at dinner time she's there,
Sayin', "Must n't kick the chair!"
Or, "Why *don't* yer sit up straight?"
"Tain't perlite to drum yer plate."
An' yer got to eat as *slow*,
'Cause she's dingin' at yer so,
Then, when Chris'mus comes, she brings
Nothin' only *useful* things:
Han'kerchiefs an' gloves an ties,
Sunday stuff yer jest *despise*.

She's a ole maid, all alone,
'Thout no children of her own,
An' I s'pose 'at makes her fuss
Round our house a-bossin' us.
If she'd had a boy, I bet,
'Tween her bossin' an' her fret
She'd a-killed him, jest about;
So God made her do 'ithout,
Fer he knew *no* boy could stay
'Ith Aunt 'Mandy *every* day.

—Joe Lincoln, in L. A. W. Bulletin.

THE GREAT ROAD OF AMERICA

IS the name proposed for a national highway, the construction of which across the continent is advocated by Gen. Roy Stone, Chief of the Good Roads Division of the Department of Agriculture. The road is proposed to first join together the states along the Atlantic seaboard, then strike across the country on a central line from Washington to San Francisco, joining there another line which connects the Pacific Coast States, being built by the different states traversed.

General Stone advocates use of convict labor in road stone-quarries, etc., and states that "Charlotte, N. C., has doubled its population in ten years simply from the results attending the construction of the roads in and about the city, under the convict labor system. The value of the property has been doubled for miles around. The convicts have constructed no less than thirteen miles out of the town."

HOISTING ENGINES,

Locomotives, Relaying Rails, Air Compressors, Drills, Steam Pumps, Engines, Boilers, Stone Crushers, Etc.

NEW AND SECOND-HAND

THOS. P. CONARD,

119 So. Fourth St., Philadelphia, Pa.

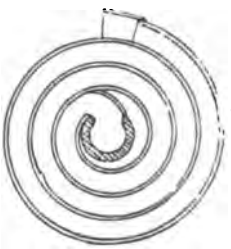
FOR SALE.

Two Blake Stone Crushers, complete, in first-class condition, with or without engines.

Also, one Ingersoll Steam Drill with twelve-horse power boiler; as good as new. Apply to

H. W. EDDY,
180 East Fourth Street, St. Paul, Minn.

SPIRAL



Sand Pump

For Feeding Sand Steel or Shot for

SAWING STONE.

Of all Kinds. Does More Sawing, Uses Less Sand and Water, Requires Less Power and Repairs than any other. Runs only 20 revolutions per minute Pays for itself in Six Months.

FRENIER & LeBLANC, Rutland, Vt.



"THE SURE GRIP."

The World's Best Tackle Blocks. . .

Holds load at any point without fastening the rope. Is as safe as a chain block. Marble and Granite Dealers by its use can facilitate their work, and effect great economy.

Write and get full particulars of what it can do for you.

Fulton Iron & Engine Works

Brush Street .

DETROIT, MICH.

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NOTES FROM QUARRY AND SHOP.

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to government headquarters at Washington have been tested and found to be the toughest sandstone known. A test of 100,000 pounds was put upon them and they stood it without flinching. The stone takes a fine polish—another important advantage. There is practically an unlimited supply, and if it is found practicable to quarry it the industry will be an important one.

St. Cloud, Minn.—Through the efforts of a number of St. Cloud aldermen and an ex-alderman, the St. Cloud granite producers have secured from the city of Minneapolis large contracts for paving blocks, the number already contracted for being something like 230,000. Two large contracts were awarded to the Northwest Granite Company, of St. Cloud, and the blocks will be cut this season. The orders referred to will be used for paving alleys in the city of Minneapolis, and a part will be used by the Northern Pacific Railway. Forty granite cutters are already at work on this class of cutting. Eight or nine of this crew are experienced paving cutters from Sioux Falls and Dell Rapids, S D. It is also understood that Walter Arnold, another granite producer of this city, has a large order for paving blocks. This has been the best year in granite thus far St. Cloud has seen in years, and there is not an idle granite cutter or quarrier in the city.

The Amalgamated Bluestone Workers of New York and New Jersey now have six local assemblies of the Knights of Labor in Manhattan and Brooklyn Boroughs, Kingston, Oxford and Saugerties, in that State, and in Newark, N. J.

The strike of the quarriers of the Western Stone Company, at Lemont, Ill., has been settled, the company agreeing to pay the men the $1.50 a day demanded, and work has been resumed. The quarriers at Joliet at last advice were holding out for $1.75 a day.

Mansfield, O.—Charles Brumfield, receiver in the case of T. A. Parry vs. The Lucas Stone Company, has filed in common pleas court a report of his stewardship in the premises. Receiver Brumfield reports that he has sold the Lucas property of the company to T. A. Parry for $4,000, at private sale, and asks that the court confirm the sale.

The Williamsport (Ind.) Stone Company secures the contract for stone to be used by the Illinois Central road in the elevating of their tracks at Chicago. The quantity of stone used will be in the aggregate from 13,000 to 15,000 cubic yards, and the stone will all be dressed here at the yards before shipping, thus requiring a force of at least fifty and probably seventy-five men for the balance of the season. Channeling machines, steam hoists and derricks will be added and the capacity increased to meet the demands of business.

New York City.—The Board of Managers of the Joint Traffic Association have recommended the following rates: On marble classified in the 4th, 5th and 6th classes of the official classification, and subject to the rules and regulations thereof, from New York (with the usual differences from other seaboard cities) to Western points on the basis of 24 cents per 100 pounds, 4th class; 21 cents per 100 pounds, 5th class, and 17 cents per 100 pounds, 6th class. From New York to Chicago, except that the minimum rates to Trunk Line Western termini and points west thereof, shall be on the basis of 17 cents per 100 pounds, 4th class; 15 cents per 100 pounds, 5th class, and 12 cents per 100 pounds, 6th class, from New York, unlesss regular tariff rates are less.

The smaller lake at Syracuse, Ind., has been surveyed in the interests of the Sandusky Cement Works in locating the marl to be used in the manufacture of cement.

New York City.—Justice Stover, in the Supreme Court, has denied an application of Castanti Cassinni for a writ of mandamus to compel the Italian Marble Mosaic Workers to reinstate him to membership.

Republic, Mo.—A new company is called the Republic White Lime Company. Its officers are: Dr. G. B. Darrell, president; A. D. King, vice president; O. D. Lutz, secretary; John McKnab, treasurer, and P. O. Rainey, manager. They have just begun building a plant with the very latest devices known and ultimately expect to have twelve or more kilns.

C. L. Daugherty, Portsmouth, Va., grocer and marble dealer, has assigned; liabilities, $2,632.

Minneapolis, Minn.—James D. Shearer, assignee of the Twin City Lime and Cement Company, in response to a petition, has been ordered to advertise for bids for the plant and lime rock land of the estate at Red Wing.

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THE "NEW INGERSOLL"

WRITE FOR CIRCULAR.

Air Compressors Rock Drills—Coal Cutters

The Pohlé Air Lift Pump.

The Ingersoll-Sergeant Drill Co.,

[illegible]

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Stone City, Iowa.—F. Erickson & Co., stone. Frank Erickson gave chattel mortgage for $3,164.

Le Claire, Iowa.—Fred Theleman, contractor and quarry, reported to have given bill of sale for $525.

Fitchburg, Mass.—Jeremiah Shea, quarry reported to have recorded chattel mortgage for $2,000.

McKeesport and Brownsville, Pa.—T. S. Wright's Sons, marble, etc., reported to have given executions for $3,361.

Lancaster, Pa.—George Kaufman, marble, reported to have given judgment for $1,100.

Quincy, Mass.—Alphonse Reinhalter, granite.

Thomas O'Connell, one of Chicago's pioneer citizens, died April 24. He was President of the Artesian Lime and Stone Company and also o the Rice Stone Company.

Montpelier, Vt.—Sumner Kimball, one of the pioneer granite men.

Saratoga, N. Y.—Edward C. Reynolds, of Hartford, Washington county, a retired marble dealer, suffering from melancholia, committed suicide.

New Haven, Conn.—Connecticut Concrete Company's stone crushing plant in Orange burned. Loss, $4,000, with $1,000 insurance.

E. T. Bradley, of Swanton, and Lieutenant-Governor Fisk have leased the extensive variegated marble quarries at Swanton Junction, Vt., known as the Bullard quarries.

The Vienna (Ill.) Marble Works has changed hands again recently. Messrs. Chas. Gent and J. M. Groves are the owners, the former of Marion, Ill., and the latter of Metropolis, Ill.

Senator A. O. Crosby has sold his quarry in East Glastonbury, Conn., to Henry R. Brooks.

Utica, N. Y.—Pierce Thomas and David Jones have formed a copartnership and have purchased the stone yard formerly conducted by the late Edward Callahan.

Kingston, N. Y.—Several of the leading wholesale dealers in bluestone held a meeting to form an association to fix a price of wages to be paid to mill men and stone-cutters for the season. Representatives of Julius Osterhoudt, Hewitt Boice, B. Taylor Harris, Rogers & Tappen, James T. Maxwell, Julius Osterhoudt & Co., Malden, and E. Sweeney & Sons, were present. It was decided to adopt the same wages and hours as prevailed last year.

Clarence Roe and Isaac Jaycox have given up their first quarry and bought out Renny Peake's interest in the quarry at Wakeman Brook, N. Y.

H. Hutchcraft has bought the Benton (Ill.) Marble Works.

Sault Ste Marie, Mich.—The Soo Marble and Granite Works is the name of a new institution that will be established here by George Laundy, late of Port Huron. Mr. Laundy recently purchased of his father, Thos. Laundy, the Port Huron Marble and Granite Works and will remove the establishment to this place.

Owosso, Mich.—H. L. Scheer has returned from Chicago and purchased an interest in E. A. Steadman's monument works. The firm name is Steadman & Scheer.

Valparaiso, Ind.—John W. Hughart has bought a half interest in the McGillicuddy Marble Works.

Lynn, Mass.—Kavanaugh & O'Keefe, marble, reported to have dissolved partnership.

Washington, D. C.—Jouvenal, Kirby & Co., stone, reported to have sold out.

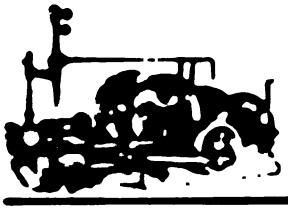
F. E. Cole, of Ellwood, Pa., has leased a quarry and will operate it this summer.

Decatur, Ind.—Miller & Co., of Marion, are preparing to start their large stone quarry north of town.

Iron Mountain, Mich.—Many people supposed when the personal property of the Northern Michigan Marble Co. was sold at Foster City a few weeks ago that this would wind up the marble industry in the Upper Penninsula for a long time at least, but this supposition was erroneous and there is every reason to believe that a new company will be organized with ample capital to insure the placing of the business on a paying basis.

Denver, Col.—Western Onyx and Marble Company reported to have given deed of trust for $300,000.

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THOMAS CARLIN'S SONS.

Allegheny, Pa.

Hoisting Engines, Derricks of Steel or Wood, Contractor's Tools and Machinery.

Stone Workers'

FILES AND RASPS



HAMMACHER, SCHLEMMER & CO.,

IMPORTERS.

209 BOWERY NEW YORK.

AUSTIN & WESTERN CO., LTD., CHICAGO, ILL.



Portable and Stationary Rock Crusher Plants.
Elevators and Screens.
Reversible Road Rollers.
Carts and Dump Wagons.



McKIERNAN DRILL CO.

120 Liberty Street, New York.

Rock Drills

Air Compressors
Quarrying Machinery.

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Mankato, Minn.—Gus Widell has come into possession of another stone quarry. He has purchased 100 acres of land known as the Frank Schaefer farm, which adjoins the McMullin quarry on the north. The consideration was $10,000.

Coldwater, Mich.—A company has been organized with a capital of $300,000, to operate what has commonly been called the Cole Marl Beds, situated south of the city cemetery. It is proposed to erect a cement factory.

A new quarry is opening at Ludlow, O., by the Climax Stone Company.

J. C. Porter, John Selby, I. B. Wilford and R. M. Wilford, all of Bowling Green, Ky., have purchased lithographic stone lands in Clay county, and will probably open quarries.

Lamar, Mo.—James Hall, marble, reported to have recorded chattel mortgage for $329.

Covington, O.—D. L. Face, stone, reported to have conveyed real estate for $20,000.

Findlay, O.—O. C. Altman, quarry, reported to have given real estate mortgage for $100.

Springfield, O.—Pettigrew & Brother, stone and lime, John L. Pettigrew reported to have conveyed real estate for $1.

Roanoke, Va.—John T. Brown, marble, reported to have made an assignment.

Fitchburg, Mass.—E. W. Terrell, granite, reported to have recorded chattel mortgage for $1,500.

Springfield, O.—Pettigrew & Brother, stone and lime, reported to have recorded chattel mortgage for $68.

Toledo, O.—Andrew Fleischman, stone, reported to have given judgment for $266.

Covington, O.—The Covington Stone Company reported to have conveyed real estate mortgage for $2,295.

Philadelphia, Pa.—James Mann & Co., marble and brownstone, reported to have given judgment for $86.

Baltimore, Md.—Judge Wickes signed an order requiring cause to be shown by May 10 why a receiver should not be appointed for Carter & Kilburn, dealers in stone materials. The plaintiffs are Brandan & Hartman, and they allege that they agreed to furnish the stone used in the erection of eleven houses, and the account has not been paid.

Roanoke, Va.—John T. Brown, a dealer in and manufacturer of tombstones and monuments, conveyed assets of the concern to J. P. Woods, as trustee, for the benefit of creditors. The assets are greatly in excess of the liabilities, the former being placed at $2,200 and the latter $1,500.

Mansfield, O.—The Columbus Granite Company has begun suit in common pleas court again against E. M. Wolfe for $193 on an account.

Findlay, O.—The National Machine Company, of Tiffin, has commenced suit for a receiver for the West Park Lime and Stone Company, of this city. Their claim is for $1,313 and is signed by Andrew Bruon and C. B. Metcalf.

Columbus, O.—The capital stock of the Columbus Slate Company has been increased from $5,000 to $10,000. W. J. Keever is president of the concern.

Jackson, Ky.—Beattyville Lumber and Stone Company has been incorporated by G. W. Gourley, Ira Stratton and S. K. Baird. Capital stock, $3,000.

Philip Knoll Marble Company, Chicago; capital stock, $3,500; incorporators, E. G. Henkel, Philip Knoll and J. M. Taylor.

Langdon Stone Company, of Hornersville, Mo.; capital, $10.000. Incorporated by A. J. Langdon, J. H. Dunmeil, A. Hass and W. M. Cates.

The F. J. Clarke Company; lime, cement and stone; capital, $5,000. Office, Mamaroneck, Westchester county, New York.

Newark, N. J.—The Union Cut Stone Contracting Company. The company will buy, sell and deal in all kinds of masons' and builders' materials and furnish, provide and contract for all kinds of cut stone. Its principal office will be in this city, and its capital stock is $50,000, of which $1,000 is paid in. The incorporators are John T. Monahan and William Telfer, of Newark, and Daniel McCollum, of Harrison.

Knoxville, Tenn.—The Ross Marble Company, of Knox county, was granted a charter

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Sullivan Quarry Bars
Sullivan Gadders
Sullivan Rock Drills.

RAPID STRONG CONVENIENT



Channeling Machines for All Kinds of Work.

Prospecting Quarry Lands with Core Drills.

SULLIVAN MACHINERY CO.

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by the secretary of state. The incorporators are J. M. Ross, D. L. Ross, Ed H. Eaton, F. S. Mead and James Maynard. The capital stock of the company is $10,000.

Logan Granite Company, of Borough of Manhattan, New York City, to build stone structures; capital stock, $10,000; directors, Robert Logan, Thomas Findlay and Robert L. Findlay, of Borough of Brooklyn.

Notice is given that application will be made to the governor of the state of Pennsylvania, on the 24th day of May, 1898, for a charter of an intended corporation to be called the Lowell Limestone Company, Newcastle, Pa., the character and object whereof is the carrying on of the business of mining and quarrying limestone in the township of Mahoning, county of Lawrence and state of Pennsylvania, and selling the same.

Goshen, Ind.—John B. Slaughter, of Goshen, died May 5 of paralysis. He had been in bad health for a long time. Mr. Slaughter was born at Ravenna, O., March 3, 1831.

Dayton, O.—Daniel Renner, well known in the stone business, aged 66 years.

Bernard J. Mallon, superintendent of the Pochuck Granite Company, Goshen, N. Y. He was superintendent of the Mount Adam Granite Company, was president of the Mount Eve Granite Company, superintendent of the Empire State Granite Company, and afterwards of the Pochuck Granite Company.

Wheatland, N. Y.—Consolidated Wheatland Plaster Co., to manufacture plaster and cement, organized. Capital $50,000. Directors, John M. Hortoun, Chas. Freeman, Benj. L. Greider, Edward Sprague and John Vaughn.

Calmar, Iowa.—A new stone quarry has been opened on the Golleman farm near town and a twelve inch strata of stone laid bare which is something similar to the Clermont dolomite.

The Lowell Limestone Company, Lowellville, O., have received new orders for limestone, and will want to employ about twenty-five more men at once.

A rock crushing plant is to be put in by the Northwestern at its quarries near Cedar Rapids, Iowa. It will require about 100 men to operate it, and it will have a capacity of about 600 yards of crushed stone per day. The plant put in, it is estimated will cost about $30,000.

Grange, N. H.—The Kilkenny granite quarry is likely to be re-opened this spring.

Martin's Ferry, W. Va.—Wm. Koehnlein has opened a stone quarry on the De Hass estate.

Orange, Conn.—The Connecticut Concrete Company, stone crushing plant, damaged by fire at a loss of $4,000; insured for $1,000.

Quincy, Mass.—O'Brien & McNeil, granite, reported to have dissolved partnership.

Jacksonville, Ill.—Readner & Meany, marbles, succeeded by Wm. Readner.

Shelby, O.—Whiting & Brouck have purchased the Shelby Granite works of C. E. Vinson.

German Settlement, O.—John Amstutz has bought a half interest in the Sidler & Townsend stone quarry, he buying Townsend's interest.

Scranton, Pa.—Tiffany & Brecht have leased the Buck quarry of S. B. Hartley for the season.

Nicholson, Pa.—Will Shields has leased a quarry about one mile from Alford on the road leading to Brooklyn. He believas it a valuable one. He has one also leased at New Milford.

Hancock, Me.—Mr. F. Orcutt, formerly of Springer & Orcutt, granite dealers, has leased the Alonzo Abbott quarries at Sullivan, where he will conduct the business alone.

Traverse City, Mich.—H. D. Alley has bought the marble and monumental business of Richmond & Piltz.

Calais, Me.—The stockholders of the New Brunswick Red Granite Co., of Maine, have perfected arrangements to sell this plant to Mr. C. W. Young, of St. Stephen, who proposes to start the works immediately.

The Union Granite Company, a large West New York manufacturing concern, has put the employes on half time at a reduction of 10 per cent. in wages. This affects about one hundred men. The company employ a large number of horses. The action of the concern i

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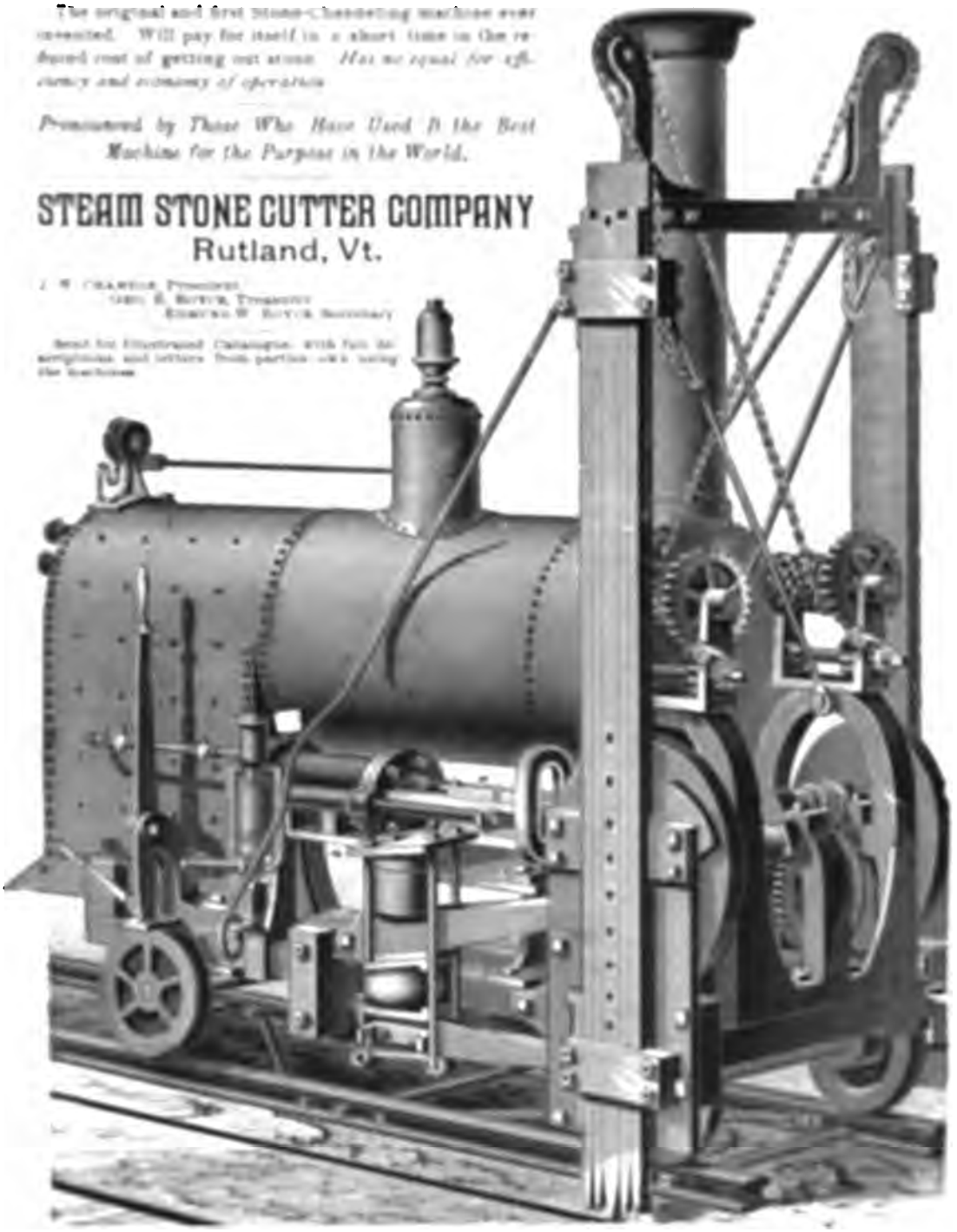
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due, it is said, to the effect of the war situation on the building trade in New York, which is badly crippled at present.

April 30 the employes of the Ulster Blue Stone Co., at Malden, N. Y., were called into the office by President Harris and told that on Monday they would not operate their works unless the men were willing to accept the same wages as paid last year. The employes belong to the Mill Men's Union and Stone-cutters' Union and as a scale of wages has been adopted by the Union the men will have to cease work, although they are willing to resume work at last season's wages.

Preliminary work at the granite works commenced this week by the putting in order of the shafting and other machinery under the supervision of Mr. Griffin with a corps of assistants preparatory to regular work in quarrying, hoisting, cutting, shaping and polishing monuments and gravestones. Following this will be the utilizing of all broken stone in the manufacture of paving blocks and crushed stone for streel work for which there is a great demand for use in cities and by railroads.—Montello (Wis.) Express.

Long Island City, N. Y.—The contest between the Stone Trade Association and the old unions seems no nearer an amicable adjustment than at any time since the trouble began. Those firms that determined to resist the demands of the Stone Machine Men's Union show no disposition to yield to the Stone Trade Association. A new Stone-Cutters' Union has been organized as well as a Stone Machine Men's Union, and all the new employes of the firms who stand out against the demands of the men are admitted to one or the other of these unions.

Chicago, Ill.—The stone-cutters' strike is not settled at this writing, but is expected soon. About 1,000 members of the union quit work. They were joined by the hoisting engineers, who demanded an increase from 36 to 45 cents an hour. Both unions are affiliated with the Building Trades Council. The yard owners announced a cut from $4 to $3 a day, beginning May 1. This precipitated the strike of the stone-cutters. There are other grievances which the men have against the bosses. The introduction of machinery has forced a large number of the men out of work. In many of the yards apprentices have taken the places of men in handling the product of the planers. The men demand that for each single planer used four mechanics, and for each double machine eight shall be employed. In this way they expect to prevent the machines from monopolizing all the work. The stone sawyers and rubbers joined the cutters, and demanded an increase from 35 to 37½ cents an hour. Steam derrick men asked an advance from 31 to 37½ cents.

LATER.

There was a break in the Cut-Stone Contractors' Association Friday (May 6), five employers from the West Side signing the union agreement in order to open their yards. The Contractors' Association, it is said, have taken action looking to the ending of the srrike or lockout.

Louisville (Ky.) city council passed the resolution requiring all the stone used on the streets of Louisville to be purchased from local quarries. It killed an ordinance requiring all firms, persons, and corporations who do work for the city on contract to employ only men who have been bona fide residents of the city at least ninety days.

New Galilee, Pa.—The Hartman stone quarries have closed down. No demand for stone since the war scare arrived.

Cadiz, O.—The stone quarries are running at full blast. From forty to fifty men are employed.

Middletown, Conn.—A quarry official believes that the present gang of men employed at the brownstone quarries will have work through the entire season. The end of the Spanish-American war seems almost in sight, and when negotiations of peace are completed undoubtedly a boom of prosperity in all trades will follow.

Oneida, N. Y.—Frank E. Conley, owner and operator of the large stone quarries at Higginsville, ascribes the cause of his financial embarassment to the exhaustion of the $9,000,000 canal improvement fund. There was filed in the Oneida county clerk's office in favor of the Oneida County Bank, of Utica, a judgment against Mr. Conley for $5,877.75. Another judgment for $485 was filed in favor of Michael Doran, of Durhamville, and later there was filed a bill of sale given by the stone man to John A. Squires.

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The Candee & Krekeler Company, Brooklyn, N. Y.; to deal in blue stone and building materials; capital, $100,000, and directors: Fernando C. Candee, Jr., Thomas Krekeler and Warren E. Gates of Brooklyn.

Portland Stone Company, Chicago, certified to an increase in capital stock from $30,000 to $50,000.

Mr. Simon I. Kemp has been appointed receiver for the Mystic Quarry Company, of Phœnix, Md., with offices at 113 Commerce street, Baltimore. He is the president of the company, which is alleged to have become insolvent from a great outlay for a quarry and plant. The company was incorporated in 1894 with a capital stock of $10,000. Mr. Kemp filed bond for $5,000.

Phillip Valliere, of Fitchburg, brings action against the Webb Granite and Construction Company, of Worcester, Mass., with *ad damnum* of $5,000, to recover for alleged personal injuries.

Minneapolis, Minn.—James D. Shearer, assignee of the Twin City Lime and Cement Company, filed schedule of assets and liabilities with the Clerk of Court, showing liabilities of $13,693.68, and assets of $45,669.83, exclusive of a large amount of suspense accounts.

Los Angeles, Cal.—H. Lapham, a dealer in stone and marble supplies, filed his petition in nsolvency. His liabilities are $18,159, and his assets are of the estimated value of $13,111.

Judgment by default for $896.36 in favor of David G. Scholton against the Davidson Marble Company, of Watertown, N. Y., has been filed at the county clerk's office.

John M. Tallerday, of Wappinger's Falls, N. Y., has brought suit against the Hudson River Stone Supply Company, to recover $25,000 for personal injuries.

Chicago, Ill.—The Dolese & Shepard Company has executed a trust deed for $250,000 on all the property used by them in their business, including stone quarries situated at Hawthorne and in DuPage county, in favor of the Illinois Trust and Savings Bank Company. The deed was given to secure the payment of 250 bonds, of $1,000 each, bearing date of April 1, 1898, due in ten years, and bearing 6 per cent. interest.



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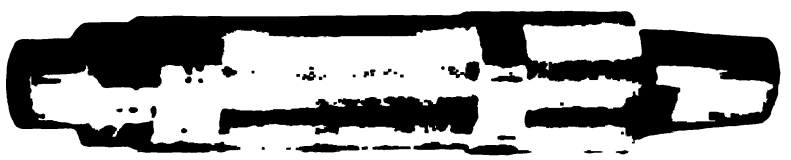
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John Schlimgen, of Madison, Wis., made a voluntary assignment to James E. Conklin. The liabilities are believed to be about $30,000 and the assets about the same amount. The firm of John Schlimgen & Son, engaged in the marble business, is not involved. Mr. Schlimgen is the senior member of the firm.

Chicago, Ill.—The Joliet Limestone Company has given to the American Trust and Savings Bank a trust deed on its property for $400,000. The deed is given to secure the payment of bonds issued to the amount, dated April 1, 1898, running twenty years and bearing 5 per cent. interest. The issue is made to take up the former issue as they mature.

Williamsport, Ind.—Williamsport Stone Company, reported to have given chattel mortgages and real estate mortgages for $7,100.

St. Paul, Minn.—St. Paul Stone Company reported to have been attached for $600.

Worcester, Mass.—Worcester Marble and Granite Company, reported to have recorded chattel mortgage for $2,500.

Wilburtha, N. J.—Florence McCarty, quarry, reported to have recorded chattel mortgage for $400.

Baltimore, Md.—The Beaver Dam marble quarry has put on a rush force to meet a large government order. There are employed in the quarry over two hundred men.

The Illinois, the Western, and the Phœnix stone companies at Lemont, Ill., reached an agreement with their striking employes and the men resumed work at the rate of 15 cents an hour for ten hours each day.

The largest block of marble ever sent out of East Tennessee was shipped by way of the Baltimore & Ohio railroad to New England during the first week in March. It was consigned to Norcross Bros., at East Cambridge, Mass., and it weighed 45,000 pounds. It was quarried near Knoxville.

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CONTRACT NEWS.

Pittsburgh, Pa.—The United Presbyterian church, Rev. Dr. William J. Reid, pastor, contemplates building a new church to cost about $100,000. Major A. M. Brown, president of the building committee.

Altoona, Pa.—Architect Will East, Pittsburgh, is preparing plans for a $50,000 stone church at Altoona.

Harrisburg, Pa.—The directors of the Y. M. C. A. have decided to erect a new building. It will cost about $50,000. Jas. A. Stranahan, president.

Newark, O.—A. Y. M. A. building will be erected soon. No plans have as yet been selected. Address B. Franklin.

Winsted, Conn.—The Second Congregational Church Society, of West Winsted, Conn., is to build a new $40,000 church. W. L. Camp, chairman of building committee.

St. Paul, Minn.—C. S. Frost, Chicago, has prepared plans for the enlargement of the Union Depot. Work will be commenced June 1. Estimated cost $50,000.

Milwaukee, Wis.—Bishop Nicholson has under consideration the erection of an Episcopal church.

Milwaukee, Wis.—The plans prepared by J. Roth for the new Immanuel Lutheran Church have been accepted. The church will be 42x 80 feet, with a spire 110 feet high.

Traverse City, Mich.—The County Board has under consideration plans and specifications for the court house, for which $35,000 in bonds have been issued.

Leavenworth, Kan.—S. O. Yates, Richmond, Ind., has completed plans for a new church to be erected at Leavenworth, Kan.

Abilene, Kan.—The Abilene G. A. R. Post is to build a G. A. R. monument, to cost $1,500, and is to be placed in the court house square. The money will be raised by subscription.

Grundy Center, Iowa.—The Presbyterian Society has pledged $8,000 towards a brick and stone church to be erected this summer. R. M. Finlayson, chairman of building committee.

Madison, Wis.—The board of directors of the Y. M. C. A. has decided to take steps to erect a building to cost $30,000. A correspondence with architects, local and outside, will be opened at once to secure the submission of plans.

Quincy, Ill.—George P. Behrensmeyer has prepared plans for a $50,000 Brewery plant, to be erected by the Quincy Brewing Company

Nashville, Tenn.—W. B. McBride, representing a Chicago brewing company, has obtained an option on a plot of ground in Nashville, on which the company proposed to erect a large brewery plant.

West Superior, Minn.—Plans have been prepared by R. J. Haxby for a $12,000 church to be erected by the congregational Society.

Coshocton, O.—The Commercial Banking Co., will build a $10,000 banking building. Marble and tile work. Kremer & Hart, Columbus, architects.

Vincennes, Ind.—The trustees of the M. E. Society have asked for plans and specifications for $10,000 church.

Dubuque, Iowa.—The Dubuque Star Brew-Co. has been incorporated to build a brewery plant.

Phiadelphia, Pa.—Plans have been submitted to the building inspector for a handsome stone and brick pointed Gothic Catholic Church, with tower and spire, to be erected. Rev. G. J. Wolf, Rector.

Chanute, Kan.—The Santa Fe will soon commence the erection of a new depot at Chanute Kan. The building is to be two stories high, and will cost about $20,000.

Elwood, Ind.—W. S. Kauffman, Richmond, Ind., has completed plans for the new Christian church to be erected at Elwood.

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Savannah, Mo.—The Andrews county court has under discussion the erection of a $48,000 court house and a $12,000 jail.

Grafton, Pa.—The M. E. congregation of this place, Rev. Dr. Jones, intends to erect in the near future, a church building of stone at Grafton. No architect has been selected.

Sibley, Iowa.—The Congregational Society has voted to build a church to cost $10,000.

Salem, Ill.—The Cumberland Presbyterian Society are arranging to build a new church. Estimated cost, $10,000. Hon. J. W. Larimer, J. B. Bryan and W. H. Betts, building committee.

Suffield, Conn.—The town of Suffield has consented to allow Sidney A. Kent to erect a library to be known as the Kent Library on the public common, and when it is done to present it to the town free of expense. Cost, $25,000.

Raleigh, N. C.—The Episcopal Society of the Good Shepherd will build a new church. Rev. J. McK. Pettenger, rector.

Harrisburg, Pa.—The St. Paul's M. E. Society will build a $10,000 church.

Brookline, Mass.—The All Saints Episcopal Society will build a $25,000 church.

Marion, S. C.—Plans for the proposed Marion county court house and jail have been prepared by A. J. Byran & Co., of Atlanta.

Omaha, Neb.—Passenger station. Union Pacific R. R. Co., Frost & Granger, Chicago, Ill., architects. Contract not let. Cost, $150,000. Brick, stone, pressed brick, stone trimmings, cement work, marble work, mosaic work, slate roofs. Horace Burt, president, Omaha, Neb.

Manitowoc, Wis.—The Sisters of St. Francis, through their representatives, have secured option on a site for the erection of a $40,000 hospital.

Springfield, O.—The council has decided to submit to the people the question of issuing $20,000 in bonds to build a city jail.

Clinton, Ill.—The Clinton Universalist Society has adopted plans for the erection of a $10,000 brick and stone church.

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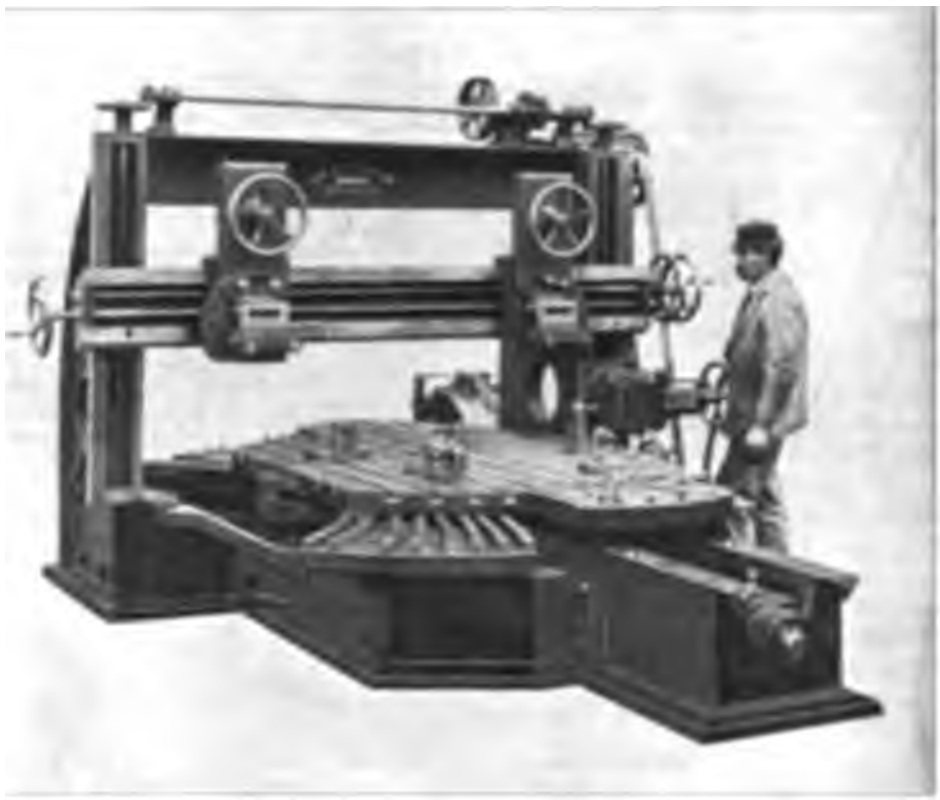


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Toledo, O.—The proposition to issue $100,000 jail bonds was carried.

Atlantic City, N. J.—Competitive plans are to be asked by the authorities of this place for city hall building; cost, $80,000.

Braddock, Pa.—The congregation of the First Presbyterian Church, of this place, will erect a handsome church, to cost $20,000. Rev. W. G. Reagle, pastor.

Cassopolis, Mich.—The election in Cass county for the new court house at Cassopolis carried by over 200 majority.

Deer Lodge, Mont.—The Deer Lodge commissioners have under consideration a jail and court house. Estimated cost, $97,000. M. J. Martin, county clerk.

South Bend, Ind.—The Citizens' National Bank has decided to build a new banking office. C. F. Lindsey, cashier.

Urbana, Ill.—The Presbyterian Society propose to build a new church in the near future. Rev. Geo. L. McNutt, pastor.

Greenville, Tex.—The Hunt county commissioners propose to build a new court house.

Ft. Smith, Ark.—Adolphus Druiding, Chicago, has prepared plans for the $50,000 Catholic church to be erected. Rev. Lawrence Smyth, pastor.

Butler, Pa.—The Butler county commissioners have decided to repair the jail at a cost of $30,000. Bonds will be issued.

Pittsburg, Pa.—Architect Daniel Burnham, of Chicago, is the architect for the new $150,000 structure of the Union Trust Co.

Buffalo, N. Y.—Green & Wicks, architects, Buffalo, N. Y., will soon ask for bids for the new $300,000 Buffalo Savings Bank Building.

Shelbyville, Ill.—The First M. E. Society has under consideration plans for a $15,000 church.

Baltimore, Md.—The M. E. Church, South, will erect a new church on Wolcott street. Rev. Wensel, pastor.

Pittsburgh, Pa.—St. Augustine's congregation will erect a brick and stone convent three stories high. Cost, $12,000. Rev. Hyacinth Epps, pastor.

Stevens Point, Wis.—The Scandinavian Lutheran Society has adopted plans for a $20,000 church.

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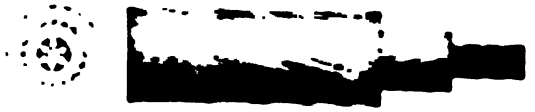
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BOOKS AND PERIODICALS.

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Messrs. Lee & Shepard, Boston, have just published a most interesting piece of fiction by Henry Wood, entitled, "Victor Serenus." The scene is located in that very dramatic period of the world's history, the Pauline era, and through graphic character delineation deals with the thought, customs, and religious systems of that time. Its aim is to draw a true and well-proportioned picture of the actual conditions, avoiding an overdrawn and debasing realism, so often employed for the sake of exaggerated contrasts.

With unimportant exceptions, Paul is the only historic character, and those who have been privileged to read the advance sheets are of the opinion that the various dramatic and psychological situations which are depicted during his unique development are remarkable. Victor Serenus, and the other leading personalities that are employed, are representative creations.

While the historic framework is carefully preserved, there is a wide range of the fancy and imagination in the movement, and a wealth of mystical, pyschical, and wierd phenomena deftly woven into the fabric of the story. Love, adventure, romance, idealism, and magic are handled in action to combine entertainment, instruction, and profit. Mr. Wood's former books, which have passed through many editions, have been mainly philosophical, ethical, and metaphysical (one of which, "Ideal Suggestion," has been translated into Chinese, and had a wide circulation in that empire), but in the present work the graces of the imagination stand out with great power in plot, action, style, and purpose.

The book is a closely printed volume of five hundred pages, and good judges predict for it a great circulation and popularity.

A stirring poem on Cuba, by Joaquin Miller, opens the May number of Frank Leslie's Popular Monthly. "Naval Warfare of To-day" is an elaborate article, giving the most complete and best illustrated description of this much-talked-of topic that has yet appeared. It is written by Frederick Stone Daniel, and is accompanied by more than twenty-five half-tone cuts of all the leading warships in our navy, including a beautiful water-color frontispiece of the battleship Maine. Another timely paper is one on "The National Congress of Mothers," the most important of the so-called "women's movements," and which is to hold its second annual gathering next month. It also is well illustrated. The article on Andrew Jackson this month is by Francis Worcester Doughty, and treats of the "Medallic History" of Old Hickory, describing the medals, coins and store-cards that were struck to commemorate some important acts of the General and President. The illustrations include reproductions of these medals and coins and some unfamiliar portraits. There is an interesting description of the Reformed Church in America, by David James Burrell, D. D., the sixth in the series on religious denominations in this country. There are several very clever short stories, a department for boys and girls, and other features. — Frank Leslie's Publishing House, New York.

"AT THE FRONT," by Oliver Optic. Blue and Gray Cloth. Gold Dies. Illustrated. Lee & Shepard, publishers, Boston. Price, $1.50.

"At the Front" is the fifth of the series of "The Blue and the Gray—on Land," and the last but one of the six volumes. It is a continuation of the narrative contained in the preceding books, wherein is given the history of the Riverlawn Regiment from the formation of the two companies as a squadron, in which it rendered its first service for the preservation of the Union, till in the present volume it becomes a full cavalry regiment of twelve companies, with three battalions, a colonel, a lieutenant-colonel, and three majors.

After the enemy was driven out of Kentucky the regiment was sent to Nashville and ordered to Murfreesboro', taking part in the battle of Stone River, which the author described in a remarkably effective and interesting manner.

The personal adventures of the characters introduced in the preceding volumes will interest the readers probably more than the details of battles and skirmishes. In the enlargement of the regiment, most, if not all, of them rise to higher rank. They participate in some sharp engagements, and they do credit to themselves, and owe their promotion to their conduct on the field of battle as well as to their strict adherence to the line of duty. But none of them are permitted to do impossible things. All of them do not escape the perils of the field, and even the colonel has to lie some weeks upon his bed from the effects of a severe wound.

As will be seen from the above, the book is full of chances for exciting incidents and adventure, of which the author avails himself, making the volume one of the most stirring and interesting of the series.

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